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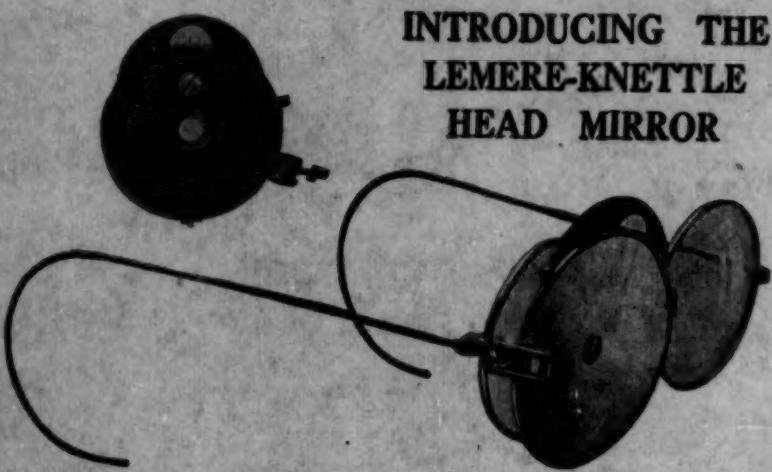
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INJURED EYE



PUPIL DILATED



NORMAL EYE

SIDEROSIS FOLLOWING PENETRATING WOUND OF EYEBALL
BY FLYING PIECE OF METAL.



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ENUCLEATION OF EYEBALL WITH IMPLANTATION OF ENDOGENOUS CARTILAGE.

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The importance of a good cosmetic result after enucleation of the eyeball is pointed out and different measures for securing it are mentioned. A method is described in which a portion of the sixth costal cartilage is used to implant in the capsule of Tenon; and a case is reported from the Wilmer Institute of Johns Hopkins Hospital in which this gave a satisfactory result.

In addition to its inestimable value as the organ of vision, the eye is of great importance from the standpoint of physiognomy. Therefore in all cases where the eye has to be enucleated, it is most desirable to form a stump that will give the most natural appearance to the artificial shell. A great variety of substances have been used in Tenon's capsule for this purpose, such as silver wire, silver, glass, platinum and gold balls, ivory, enamel, hard rubber, gauze, formalized bone, burned out bone, cartilage, fat, fascia, paraffin, sponge and spheres of elderberry or sunflower pith.

In 1915, Magitot used living cartilage grafts; but having been disappointed in these, he determined upon a two-stage operation. First he inserted into Tenon's capsule a piece of calf's cartilage, which had been fixed in 20% formalin solution. He intended to remove this cartilage three months later and to graft in its place live cartilage to form a permanent stump. The object of the first stage was to prevent elimination of the living cartilage, which is so sensitive to infection; but the insertion of the formalized cartilage was so successful in his hands, that he did not follow it with implantation of an autogenous graft.

In 1923, Sattler implanted autogenous bone, cartilage and fat, but was much more in favor of the latter, owing to its easy accessibility. Other surgeons have attempted to produce good cosmetic results by leaving in portions of the sclera, making their implantation within this cavity after the uveal tract

had been removed. Some surgeons have even maintained that the cornea remains transparent after the uveal tract has been removed and a ball inserted in the scleral cavity. However, cases of sympathetic ophthalmia have been reported following operations in which any portion of the sclera has been left.

It is generally conceded that not all of the living grafts implanted within the scleral cavity survive, as the circulation is impeded by this structure. On the contrary, living grafts that are placed within Tenon's capsule, if done aseptically, whether they be bone, cartilage, fascia, fat, etc., usually become part of the living host.

In selecting the material for the construction of a stump, the following points should be considered.

1. Elimination of foreign body—a fundamental surgical principle.
2. A rigid material is preferable, giving better motion to the artificial eye.
3. A nonirritating substance.
4. To replace the enucleated eye by material as closely related to it as possible, which would naturally be a living graft.
5. If autogenous grafts are used, the necessity of blood matching, etc., is eliminated.

REMOVAL OF PORTION OF COSTAL CARTILAGE.

After the skin over this region has been shaved and cleansed with soap, benzin, alcohol and ether, it is painted with 3½% iodin and sterile draperies applied. A vertical incision is made

over the sixth rib five centimeters to the right of the midline. This incision is used as it enables the operator to split the anterior sheath of the rectus muscle in the region of its insertion. The fibers of this muscle are divided,

ENUCLEATION AND IMPLANTATION OF CARTILAGE.

Enucleation is carried out in the usual manner, the conjunctiva being divided close to the limbus, as subsequent motion of the prosthesis is de-



Fig. 1.—Part of sixth costal cartilage used outlined in broken line.

just as in making an abdominal incision, bringing the operator directly upon the costal cartilages of the fifth, sixth and seventh ribs, which are fused together about eight centimeters from the sternum, Fig. 1.

The central or sixth cartilage can be removed without weakening the chest

pendent, to a great extent, upon the depth of the culdesacs, which cannot, of course, be of normal depth if the conjunctiva is needlessly destroyed.

The attachment of each rectus muscle is then exposed and a No. 1 plain catgut suture is inserted into the end of each. After the muscle has



Fig. 2.—Appearance six days after enucleation of right eye.

wall, as sufficient support is given by the cartilage of the fifth and seventh ribs. The perichondrium of the anterior surface is removed with the graft, the perichondrium being left on the posterior surface for future regeneration. A graft five or six centimeters in length can be easily obtained in this way, as the soft cartilage can be divided with a scalpel and raised from its bed by means of a blunt periosteal elevator. The graft is immediately placed in warm salt solution. The muscles, subcutaneous tissue and skin are closed and dressing applied.

been divided from the globe, the suture acts as a retractor. Enucleation is then completed, being very careful to keep the section close to the sclera. All hemorrhage is entirely checked by hot salt solution, and occasionally adrenalin.

While the assistant is accomplishing this, the operator fashions a cartilaginous ball from the rib graft, measuring approximately three- to four-fifths the size of the excised eye. This usually requires several pieces of cartilage, which are sutured together with triple O plain catgut. The graft is then

inserted, and the four recti muscles are sutured to each other, in cruciate fashion over the front of the graft.

The closure is made in the following manner: A purse string of No. 1 chromic catgut is passed thru the margin

taken six days after operation with the lids closed over the stump. It is seen here that there is no sinking of the upper lid, and the lid fold is practically normal, even tho the prosthesis has not been inserted.



Fig. 3.—Appearance after enucleation and implantation of cartilage.

of Tenon's capsule, closing it snugly over the anterior surface of the cartilage implant. The subconjunctival tissue is closed with three interrupted 0 plain catgut sutures. The conjunctiva is closed in a horizontal manner with interrupted fine black silk, caution

A large graft is inserted in order that a very thin light shell can be worn, thus eliminating the discomfort of a heavy prosthesis, and the possibility of a sinking due to its own weight.

Fig. 4, the patient twelve days following the operation, with the artificial



Fig. 4.—Appearance after operation with eyes opened.

being taken during this closure to have the edges of the conjunctiva brought into direct apposition, and not allowed to fold in, which would interfere with prompt healing. By this procedure all of the conjunctiva is preserved and the culdesac is practically of normal depth. The conjunctival sac is then filled with 1:10,000 bichlorid salve and dressing applied.

One case, of a girl fifteen years of age, is cited for illustration. The right eye was enucleated. Fig. 2, the stump six days after the implantation of cartilage. There is no swelling or chemosis of the conjunctiva, and no irritation of the lids. Fig. 3, photograph

eye inserted. This is merely a very thin shell covering the stump, and therefore is exceedingly light.

It has now been worn by the patient for several weeks without the slightest discomfort.

CONCLUSIONS. The use of autogenous cartilage after enucleation does away with the necessity of blood matching. It furnishes a rigid supporting stump, and avoids the likelihood of wandering of the body implanted; it should last as long as the patient lives, there is no tendency to excite sympathetic ophthalmia, and the reaction following the operation is slight.

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TRAUMATIC ENOPHTHALMOS WITH A CASE REPORT

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INDIANAPOLIS, IND.

A boy of eight years in an automobile accident was supposed to have lost the eyeball. Three years later he came with enophthalmos the appearances resembling those following enucleation. The eyeball was found displaced backward 20 mm. and firmly adherent to the wall of the orbit, posteriorly. There was probably fracture of the orbit but direct force drove the eyeball backward and displaced the orbital fat forward at the time of injury. Reported from the Department of Ophthalmology, Robert W. Long Hospital, Indiana University School of Medicine.

Traumatic enophthalmos, as usually described, is characterized by displacement of the eyeball backward, narrowed palpebral aperture, ptosis of the upper lid, and paralysis of one or more extraocular muscles with deviation of the visual axis. In a few instances the eyeball has been dislocated into the maxillary sinus.

A search of available literature, dealing with more than a hundred case reports, has not disclosed an instance in which the globe remained in the orbit, and yet was so suddenly and completely buried in orbital tissues that its absence was attributed to its destruction. Believing that this case is without a precedent, or at least has unique features, we submit the following report as a contribution to the subject.

CASE REPORT.

D. L. S., male, aged 11 years, was admitted in October, 1925, for restoration of the cul-de-sac of the left orbit.

On June 7, 1922, the patient was injured in an automobile accident. He was struck in the left eye (orbit) by the broken end of a top bow. The eyeball had disappeared when he was first seen by a physician, very soon after the accident. One week later he was examined by a surgeon who stated that the eyeball had been eviscerated, and that the orbit was infected. He did not remove the sclera. No radiograph was made. No asymmetry of the face was noted. External drainage from the orbit has been continuous, but the patient does not complain of pain or tenderness. The parents state that the left eye was normal prior to the date of accident.

The external appearances are like those following enucleation. The lids have been moderately deformed by

contracting scars, and bands connect them near the medial canthus. They hang flatly across the orbit with their ciliary borders in apposition. There is paralytic ptosis of the upper lid. The globe is absent.

Folds of redundant conjunctival membrane extend from the canthi and the orbital margins of the tarsi deeply into the axis of the orbit. The fornices are obliterated. The appearance is comparable to looking into the open bloom of the morning-glory. The tissues beneath the lids are bathed in a grayish secretion in which air bubbles form with respiratory exhalation. There are no other signs of chronic inflammation. The lid deformities were corrected, and the cul-de-sac was prepared for a prosthesis.

The patient was readmitted in April, 1926. He is not now able to wear an artificial eye. New cicatricial bands have formed between the lids on the medial side. Some secretion is present, but there is no evidence of free communication with the nasal air passages. The soft tissues at the medial side of the orbit undulate synchronously with respiration. The patient was anesthetized for operation.

A peculiar appearance of the conjunctival folds on the medial side suggested their possible connection with the nasal mucosa. While engaged in tracing them, a foreign body was found deeply within the orbit. It presented a flat black surface which dimpled when touched with a probe, and proved to be a cornea surrounded by a narrow border of conjunctiva. The plane of this surface indicated that the eyeball had been displaced straight backward an estimated distance of 20 mm. or more. The globe was evidently shrunken.

This eye is useless for vision; it has been the probable seat of inflammatory reaction and may be a menace to the fellow eye. It should be removed. An attempt to enucleate was abandoned, for the globe had been pressed into an opening in the orbital wall like a cork, and was cemented there by organized tissue. Removal of the eyeball would expose the opening. The sclera constituted a protective wall in this situation, so it was decided to eviscerate. There was no expectation of finding anything but degenerated tissues and inflammatory products.

The cornea was removed, and a few drops of clear watery fluid escaped. No lens was found. The vitreous was normal in quality but reduced in quantity. The uveal tissues were removed and showed nothing abnormal. The scleral cup was contracted and firmly fixed in the posterior limits of the orbit.

During the postoperative period all the available history of the case was obtained, and the patient was examined minutely. The left anterior orbital opening is only slightly larger than the right, and the left side of the face is broader than the right side. Trigeminal sensation is equal on the two sides. He has retained his deciduous molars, and a permanent molar has grown out on the palatal side of the dental arch on the left.

Stereoscopic plates were made and the following report was submitted: "The right optic canal is enlarged and the left is of normal size. The left ethmoidal cells are clouded, and are not as fully developed as those on the right. The left maxillary sinus is not clear. The middle third of the nasal septum is widely deflected to the right. There is now no definite evidence of fracture."

DISCUSSION.

The facial asymmetry, dental irregularity, underdeveloped and clouded ethmoidal cells, with a dehiscence between them and the orbit, and the shadow in the antral area, when supported by the history of the case, offer only presumptive proof of former fracture. The features enumerated could

exist singly or combined without a history of fracture. Bone injury is not required to account for the location in which this globe was found.

According to one theory of the production of immediate enophthalmos, a fracture of an orbital wall with outward displacement of a fragment enlarges the intraorbital space, and atmospheric pressure forces the globe backward. This case does not agree with the theory. The history is decisive that the eyeball disappeared at the time of the accident. A logical inference is that the globe was thrust back into its final location by the broken top bow. Atmospheric pressure was not a factor. Fracture may or may not have occurred incidentally. It probably did, since air bubbles were found in the orbit at the examination in 1925.

Rupture of the check ligaments would enable the globe to recede, or to be pushed back, without dragging the conjunctival fornices with it. The membranes were not drawn straight backward, but were directed toward the axis of the orbit. This could not have happened with intact check ligaments, which would have retracted all of the fornices just as sectors are retracted in ocular rotations.

The conjunctiva is loosely attached to underlying tissues, except at the canthi, over the tarsi (Fig. 2), and to within 2 or 3 mm. of the cornea (Fig. 3). In these three situations the attachments are firm. Figure 1 is a schematic representation of a cross section of a normal conjunctival sac. Figure 2 is a similar representation of the sac as found in this case. In each the sac space is purposely shown expanded. The figures are intended to show the firm, as well as the loose, attachments.

Evidently this conjunctiva (Fig. 2) has been torn loose from underlying structures, wherever it was weakly attached. Traction might account for the separation. It is more probable, since the membranous folds are directed toward the axis of the orbit, that something came forward around the eyeball,

detached the conjunctiva, and filled the space previously occupied by the fornices.

The anterior conjunctival folds are well supported. A serous effusion behind them would have been absorbed

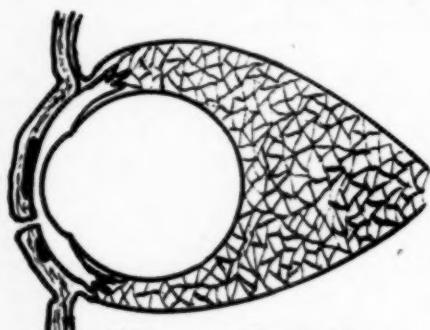


Fig. 1. Normal.
Sections of orbit and
conjunctiva. Abnormal
condition in this case
is shown below.

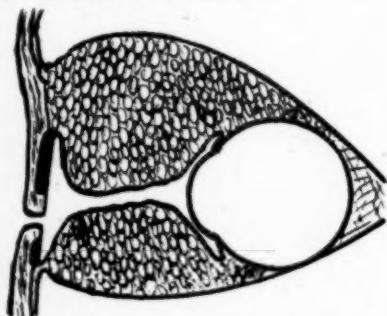


Fig. 2.

Fig. 3.



Figs. 1, 2, and 3.—Sections thru lids and orbit. Fig. 1.—Normal condition. Fig. 2.—Diagram of this case of enophthalmos. Fig. 3.—cor., cornea; c., conjunctiva; e., episclera; s., sclera.

long ago. A hemorrhage similarly situated might be absorbed. If there had been any inflammatory reaction from the injury, a hemorrhage would tend to undergo resolution, with a proliferation of connective tissue. Such tissue usually contracts. There is no evidence of subconjunctival contraction. The anterior orbital tissues are full and

soft; on the nasal side they undulate perceptibly with respiration.

Fat fills all of the orbital space not occupied by essential structures. It is supported, in small masses, by delicate fascial fibers which are formed into septa (Fig. 1). If the check ligaments could not resist the traumatic force, the fat supporting tissue could have been disorganized, or destroyed, even more easily. When the septa are ruptured the fat bodies are free and mobile, and they could have been forced forward by the receding eyeball, with or without fracture of the walls of the orbit. If the eyeball exchanged places with the retrobulbar fat (Fig. 2), the latter detached the conjunctiva and filled out the space behind the orbital septum, which may be assumed to be intact.

Ptosis of the upper lid is present in about two-thirds of the reported cases of traumatic enophthalmos. The extent of backward displacement is an undecisive factor. In Lukens' 78 collected case reports (Ophthalmology, Oct., 1906), the eyeball had receded from 2 to 12 mm. when ptosis was present, and from 2 to 6 mm. when ptosis was absent. When the lids lack the support of the globe the palpebral fissure is narrowed and ptosis is simulated. If the lid can be moved voluntarily true ptosis does not exist.

Pressure of the eyeball against the levator or its nerve cannot explain all cases of ptosis. Such pressure would also be against the frontal and the nasociliary nerves, and sensory disturbances would be expected. There has been no complaint of pain in this case, and sensation is equal on the two sides. Injury to the levator might lead to the formation of adhesions between it and some fixed point, so that the muscle could not act. No evidence of adhesion was found.

In this case there is no visible voluntary contraction of the levator, and the lid does not respond to the contractions of the frontalis. The ptosis is complete and paralytic. The nerve to the levator passes thru the sheath of the superior rectus, and could have

been torn from its muscle as the eyeball was thrust backward. The extraocular muscles presumably preceded or accompanied the eyeball in its retrogression, while the levator insertions held intact. Injury to a motor nerve is permanent. All cases of traumatic paralytic ptosis are, supposedly, due to nerve injury. In this instance the injury likely consisted of a separation of the nerve from its muscle. That the eyeball itself was injured may be inferred from its shrunken state and the absence of the lens. The latter could have been absorbed following an accidental needling or a bruising of its capsule. Shrinking of the eyeball suggests past uveal inflammation.

Other theories for the backward displacement of the globe in injuries of the orbit, as enumerated by de Schweinitz (*Am. Jour. Med. Sciences*, Dec., 1895), do not apply to immediate and permanent enophthalmos of any considerable degree. The eyeball does not at once recede very far, simply because a fracture of the orbital walls has enlarged the intraorbital space. Such an injury would usually be followed by swelling of the contents of the orbit and proptosis. Enophthalmos would not occur until after the swelling had subsided, or until the globe had been drawn backward by cicatricial contractions or adhesions resulting from inflammation. Atrophy and neu-

rotrophic disturbances are slow processes. Sympathetic paralysis does not cause a high degree of displacement.

SUMMARY.

The external appearances resemble those following enucleation. There is a paralytic ptosis of the upper lid. The cul-de-sac is contracted because the fornices have been obliterated. Transverse folds of conjunctiva are supported by orbital fat.

A shrunken globe without a lens was found at the posterior limit of the orbit, where it was bound down by adhesions and buried in the orbital tissues.

Direct force drove the eyeball backward, ruptured the check ligaments, tore the nerve from the levator, and displaced the orbital fat forward. Indirectly, the weaker attachments of the conjunctiva were ruptured.

The clouded antrum, small clouded ethmoidal air cells, and the presence of air bubbles in the orbital secretions justify the inference of a coincidental fracture.

This case of traumatic enophthalmos was caused by direct violence, with fracture as a contributing factor of secondary importance. The backward displacement of the globe was immediate, complete, and permanent. No similar case has been found in the literature.

INTRACRANIAL HYPERTENSION WITHOUT CHOKED DISC.

A. MAGITOT, M.D.

PARIS, FRANCE.

A clinical method of recognizing intracranial hypertension without choked disc is furnished by comparison of the pressure in the retinal artery with the general blood pressure observed in the brachial artery. Four cases are reported in which the diagnosis was confirmed by spinal puncture, which demonstrated and relieved the increase of intracranial tension. The use of the Bailliart method to ascertain the retinal arterial pressure is described. In one case in which there was choked disc, permanent reduction of intracranial tension was shown by the Bailliart procedure, altho the papilledema subsided very slowly.

The intracranial hypertensions, without choked disc, are still little known and relate chiefly to what may be called, for want of a better name, serous meningitis. H. Claude¹ in an excellent article, published in "Neurologic Questions of the Day," quotes a few examples which were revealed by lumbar puncture. In the absence of ophthalmoscopic signs, the lumbar puncture and the manometric test have, up till now, constituted the sole proofs of intracranial hypertension.

In bringing our contribution to this, as yet far from hackneyed, question of the socalled serous meningitis, our intention is not to discuss whether the title given to this sort of affection is really adequate. Neither do we intend to examine whether the hypertension is imputable to a simple increase of the spinal fluid, or rather to an obstacle in its circulation. Pathogenetic considerations are in fact idle, in the absence of anatomic facts.

Per contra, what is yet generally not known, and it is this point which we propose to emphasize, is: that there exists a method capable of revealing, without puncture, without traumatising manoeuvre, the intracranial hypertension. This purely clinical method invented by Bailliart in 1917, perfected by Bailliart and Magitot² in 1919, attained this result by comparing the arterial pressures in the central artery of the retina and in the humeral artery.

Applied systematically to all doubtful cases, this method would reveal many true hypertensions; and would no doubt enable us to extend our clinical and etiologic knowledge in cases apparently very dissimilar and yet coming within the same category. We will cite a few instances.

CASE 1. The patient was a woman of 60, who, two months before, had been treated for pulmonary congestion. On the wane of her malady, she began to suffer from vertiginous phenomena, which showed improvement, at the end of a week. She went back to her occupations, but the vertigo returned which led her to apply for a consultation. She followed for some weeks a gastrointestinal treatment; and then, in view of the persistency of the phenomena, she was sent to me for ocular examination. This ocular examination was absolutely negative. No diplopia, pupillary reflexes normal. Nothing abnormal to the ophthalmoscope. The optic disc was absolutely normal in its outline, its coloring, its prominence, its vessels. But the comparison of the arterial pressures showed an inversion of the physiologic formula, and led to the diagnosis of intracranial hypertension.

The urine was normal. An examination of the labyrinth showed nothing unusual. Six days later a new examination revealed the same inversion of the formula. Then a lumbar puncture was made (patient lying). Claude's manometer showed the figure 28 H₂O. The drawing off of the fluid was stopped at 17. At this moment the formula of the blood pressure had become right again. The cystologic and chemical examination was completely negative. Negative Wassermann in the spinal fluid, and in the blood.

A few hours after the puncture the patient showed an improvement in her state. The next day she got up and four days later she resumed her normal life. Examination of the pressures showed that there was no more intracranial hypertension. This patient was examined again several times and her

case followed up for six weeks. The cure was maintained.

CASE 2. This observation concerned a woman of 50. She was sent to me by the out-door clinical service of the hospital, for cephalgia. Her "headaches" had lasted for six months, and had made their appearance after an attack of influenza. As she had complained for some days of sleepiness, it was thought that she might have encephalitic disturbance; but nothing conclusive was found. Examination of the eyes on the other hand showed no extrinsic or intrinsic muscular paresis, the pupillary reflexes were normal and the disc possessed an outline, a coloring, and a vascularisation which seemed to preclude any idea of cephalorachidian hypertension. Yet there was inversion of the formula of arterial pressures. Wasserman's test was negative. The blood urea was at 0.25. Urine was normal. This patient was reexamined ten days later; the cephalgia had not ceased. An examination of the eyes still giving an abnormal formula of the arterial pressure, I persuaded the patient to remain in the hospital and to undergo a lumbar puncture. This puncture was made, with the patient lying. Claude's manometer reached 27. The drawing-off of the fluid was stopped at 21. Cytologic, chemical and benzoin test, negative.

The next day the pressure tests showed that the formula was right again. Besides this the patient felt relief, the day after she got up, and on the third day returned home and resumed her work.

She came back a fortnight after leaving the hospital, stating that the cephalgia had come back, tho less violently. The study of the pressures showed a certain degree of hypertension. It was only then that I thought of having an auricular examination made. The labyrinth reactions were normal, but the laryngologist noted the presence of nasal polypus. The removal of this polypus was carried out without incident a few days later.

The patient was kept under observation for two months after this operation. But coincidence or not, four days

after this little nasal operation the examination of the arterial pressure showed a normal formula, the cephalgia had disappeared and did not return.

CASE 3. The patient was a man of 39, of independent means. He had suffered from comital attacks since the age of 14. Generally these attacks occurred at lengthy intervals. Still, since a few months they had become more frequent. At the time, Wassermann tests were negative, but the patient had been treated for a year with novarsenobenzol.

He was sent to the ophthalmologic clinic for examination of the fundus of the eye. The following are the results of this examination: Slight divergent strabismus of the left eye. Intermittent crossed diplopia when looking to the right. Slight pupillary inequality. Normal field of vision. Visual acuity = 1.

The fundus of the eye was absolutely normal, no dilatation of the retinal veins. However a study of the blood pressures showed a very marked dissociation of the formula. There was indeed a higher retinal arterial pressure in the left eye than in the right. Vestibular examination showed nothing abnormal. The patient was reexamined a fortnight later. His state was the same, the intracranial pressure was still high. Normal urine.

Two months passed by before I saw this patient again. He came one morning rather tired, telling me he had had an attack of epilepsy during the night, a general attack apparently. It was impossible to obtain further details. The state of his eyes revealed nothing that we did not know already. Only the retinal arterial pressures were distinctly higher than at the last examination, and in spite of that there existed no distinct distention of the disc veins.

This evidence of a persistent intracranial hypertension made me insist on the patient's submitting to a lumbar puncture which he had refused up till then. This puncture was made on the next day, the patient sitting. Claude's manometer showed the figure 42. The fluid was clear, absolutely normal,

without albuminous or cytologic reaction. Wassermann tests were negative.

This patient was followed up for a fortnight more. Contrary to the two preceding cases, the cerebrospinal hypertension returned fairly rapidly. Ten days after the lumbar puncture the retinal arterial pressures were as high as at the examination of the eye which took place the day after the night attack. However as the patient did not feel uncomfortable and no attack of epilepsy had recurred, he asked to resume his normal life and we have not seen him since.

CASE 4. The patient was a woman of 55. A year before, returning from her work, she happened to be in close proximity to a motor car collision, in which one of the cars overturned a newspaper stand. This stall fell on the pavement and struck her. She fainted and was transported to the hospital, where she was found to be suffering from a wound in the scalp, a wound in the left arm and a fracture of the left leg. She remained there several weeks; then the surgeons, considering her as cured, sent her home. She resumed her clerical work, but since this time she had always suffered from vertigo and headache. She complained of this several times, but in the surgical service, in which she had been treated, she was told that she had merely a slight depression of the external table of the cranium near the vertex and a wound in the scalp, and she was assured that these troubles would disappear.

Tired of these insignificant remissions she decided to ask for advice at the ophthalmologic clinic. At this time the accident had taken place nearly a year before. There existed no disturbance of the ocular motility. The pupillary reflexes were intact and only a slight anisocoria was remarked. Field of vision and sight normal. The fundus of the eye was quite normal and no modification in the appearance of the vessels was noted. Yet the comparison of the blood pressures showed a very distinct inversion of the formula. The labyrinthic examination showed nothing unusual. Wassermann test

negative. The motility, the patellar and olecranon reflexes were normal.

The patient was kept under observation for two months. Then in view of the persistency of the subjective phenomena and the inversion of the formula of the blood pressures, a lumbar puncture was made. The manometer showed the figure 35. Six cubic centimeters of fluid were drawn off and the needle was withdrawn at the figure 22. Both chemical and cytologic examination of the fluid were completely negative. Likewise colloidal benzoin test.

After this first puncture the patient felt relief, and for three days the formula of the pressures became almost normal again. Soon, however, it became inverted as before, and vertigo reappeared. A second lumbar puncture was made, the manometer showing 26. The flow of the fluid was stopped at 20. Examination of the fluid was as negative as on the first occasion.

Immediately after this second puncture, the patient felt none of the relief that she had felt the first time, and to our astonishment the formula of the pressures showed a still greater rise in the retinal blood pressure. Moreover, a certain modification of the discs appeared on the next day. The discs had become a little prominent and pale, the veins slightly dilated. This ophthalmoscopic aspect announcing a choked disc, the patient was transferred to the surgical ward for radiologic examination and in case of necessity for trephining.

The patient remained in a state of expectancy for three months. The radiographs had not revealed the presence of any bony splinter, the vertigo had somewhat improved, and the surgeons in the absence of any sign of localisation could not make up their minds to operate. We saw her four months after she had left the ophthalmologic service, the discs still showed a slight choking and the formula of the pressures was still high. The patient wished to leave the hospital, and it was only incidentally that we heard of her sudden death shortly after.

These four observations have a common characteristic point: In the ab-

sence of papillary signs the diagnosis of intracranial hypertension could be made by the measurement and comparison of the arterial pressures. The test of the lumbar puncture and the manometric lowering showed the correctness of this diagnosis. Another point common to these four cases is the absence of chemical or cytologic reactions of the spinal fluid. It was therefore a simple hypertension, as in the cases reported by H. Claude, a moderate hypertension moreover, since it had not been sufficient to provoke any modification at the level of the optic disc.

In all other respects, the observations on these four patients are rather different. In the first it is a state of vertigo which causes the patient to have herself examined; a state which appears to date from a pneumonia, contracted two months before. Is this a case of serous meningitis consecutive to this affection? We have no element enabling us to solve this etiologic problem. One fact remains, the lumbar puncture cured the patient.

In the second case, there was persistent cephalgia, recalling those forms of headache described by Quincke. The lumbar puncture relieved the patient, but the hypertension returned until a nasal polypus was removed. Was the polypus the cause? We know of cases of serous meningitis after nasopharyngeal infections: it may be that the polypus had favored an infection of this nature. However that may be, a coincidence or not, the fact remains; after removal of the polypus everything became normal again.

Finally, in the third case, there was epilepsy, with intermittent attacks recurring for twenty-five years, and as a recent sign, a transitory paresis in the territory of the third left nerve. Except for that, no other symptom of localisation. The puncture brought about but a temporary diminution of the intracranial hypertension. But this patient was not sufficiently followed up for the observation to be interesting in itself. No doubt he might have derived benefit from trephining, as in the observations collected in Ba-

binski's service by M. Bourdillon. May-be his hypertension would have yielded to several punctures. These are but so many gratuitous suppositions, since we have never again seen this patient, whose case we have reported on account of the diagnosis of hypertension.

It is same for case 4, whose course is evidently that of serous posttraumatic meningitis. Indeed, the intracranial hypertension is a fact. Whether it be due to one cause or to another, it constitutes a precious element for diagnosis.

We will now set forth briefly in what the method consists which makes it possible in doubtful cases to put off a puncture which all patients do not accept readily.

USE OF THE BAILLIART METHOD.

The method consists in finding the diastolic pressure in the central artery of the retina, and in comparing the figure obtained with that of the diastolic pressure of the brachial artery. The retinal artery is indeed by its circulatory regime an intracranial artery. Does it not issue from the ophthalmic, last branch of the inner carotid, starting near the place at which the circle of Willis begins? Any modification in the flow of the blood in the large basal vessels of the cranium will therefore have its effect in the ophthalmic artery and consequently in its ramifications, of which the central retinal artery is objectively the most accessible. Amongst these modifications one of the most frequent is brought about by a change in the pressure of the spinal fluid. Altho the ophthalmic artery originating in the cavernous sinus follows an extradural course in the middle floor of the cranial base, there is no doubt that a hypertension of the spinal fluid may react on the blood column which traverses it.

When we examine with an ordinary ophthalmoscope the retinal arteries on the field of the optic disc, they appear to be without motion. In reality their movements, which are synchronous with each cardiac cycle, are imperceptible, because the arterial pressure is much stronger than the pressure exerted on the outside of the vessel by

the endocular (vitreous) liquid. But should the internal pressure be in equilibrium with the external pressure (ocular tension), immediately the walls have free play and rhythmic pulsations of great amplitude appear. In order to provoke this free play of the walls it is therefore necessary to increase the pressure of the vitreous. This peculiar retinal pulse is easily observable by exerting with the finger on the eyeball a certain pressure, for in doing this we increase the ocular tension and there comes a time when the two pressures intra- and extravascular are in equilibrium. If we continue to exert a progressive pressure, the pulsations increase in amplitude and then disappear. Now, the precise instant of the appearance of the pulsations marks the moment when the diastolic pressure has been reached; the disappearance of the pulsations, the moment when the systolic pressure has been passed. This retinal pulse is therefore the same phenomenon as that which every clinical surgeon registers in the brachial or the radial artery. The only difference lies in the fact that in the eye direct examination takes the place of palpation or auscultation.

The observation of these pulsations would be of little use, had we not the possibility of knowing to what figure of the blood pressure they correspond. This can be ascertained as follows: Pressure is applied to the eyeball, not with the fingers, but with a special dynamometer. Note is taken of the pressure required to cause the appearance of the first arterial beat. This figure shows the number of grams which must be added to the ocular tension to reach the arterial diastolic pressure. The pressure may be continued until the disc whitens and the pulsations disappear. We know then how many grams must be added to the ocular tension to prevent the access of the blood in the arteries (systolic pressure). Then the figures obtained must be expressed in millimeters of mercury. A table, drawn up experimentally by Baillart and Magitot, permits us to do this transformation, if care has been taken, before

studying the retinal pulsations, to take with a tonometer the figure of the ocular tension. (It oscillates between 15 and 25 mm. Hg.)

This method has rendered it possible to recognize that in a normal man, the retinal arterial diastolic pressure was from 30 to 35 mm. Hg.; whereas the retinal arterial systolic pressure was from 75 mm. to 80 mm. Hg. These figures are those of the arterial blood-pressure at its entrance into the eye. Now, unless there be a local lesion, we may, in view of the origin of the ophthalmic artery, consider that these figures are very near those which should be found in cerebral vessels of the same calibre. The field of the optic disc is therefore from this point of view an open window on the cephalic circulation.

It only remains to define on what basis we may recognize a modification of the circulatory regime.

Baillart had remarked that the retinal arterial pressure was to the brachial pressure as 0.45 is to 1 (brachial pressure = 1, retinal pressure = 0.45). This proportion is therefore the normal one and we may admit that every time this formula is inverted there exists a disturbance, either in the cerebral or in the ocular circulation.

CEREBROSPINAL HYPERTENSION AND THE FORMULA OF PRESSURES.

The hypertension of the spinal fluid has a certain and constant influence on the intracerebral arterial pressure. It is moreover indisputable that in certain circumstances it is the contrary, and that the blood pressure influences the hydromechanical pressure of the fluid. It is so with those suffering from hypertension. But in this case a proportion is maintained, the formula remains normal. It is therefore the pressures independent of the arterial pressure which are interesting to study. We say arterial, for if we refer to what goes on in the eye we must set aside the venous pressure, which appears on the contrary to play a preponderating part in the production of pathologic hypertensions.

However that may be, an experimental fact persists: Every cephalo-

rachidian hypertension independent of the arterial pressure is expressed by a modification in the pressure of the central artery of the retina. This change of circulatory regime always precedes choked disc.

The reason is, that the disc edema does not appear early. For the appearance of this ophthalmoscopic symptom certain conditions are necessary, of which the principal is the distension of the optic sheaths by the spinal fluid. It is moreover necessary that this fluid should be stored up under a certain pressure. Under what degree of pressure? It is certainly very variable. It depends on individuals, or better on the state of the partitioning of their subarachnoidian cavities.

Here are a few figures which prove it. H. Claude reports in a patient a very pronounced choked disc, with a pressure of 25° H₂O by the manometer during a lumbar puncture. Another had a pressure of 23° without ophthalmoscopic sign. In our observations No. 1 and No. 2, there was no choking with 27 and 28 of pressure, in the observation No. 3 with 32. We may therefore conclude that the figures of the pressure of the spinal fluid which influence the modifications of the optic disc are essentially variable.

It is likewise well known to ophthalmologists that the image of choked disc is very long in disappearing. After repeated lumbar punctures, after a decompressive trephining, which has brought the patient back to life and restored his sight, the same image persists with tortuosity of the vessels and indistinctness of the outlines of the optic disc. Thus in spite of the edema having greatly diminished, its presence has destroyed the fine arrangement of the nervous fibers and for several months we might, unaware of the decompression, continue to make a diagnosis of intracranial hypertension. What becomes in this case of the arterial pressures? The reply is explicit: When there being no more hypertension, and in spite of the presence of a choked disc, the pressure in the central artery of the retina diminishes,

the formula becomes normal again. The following example proves this.

OBSERVATION: The patient was a man of 27 who complained of headaches. Wassermann tests negative. Reflexes normal, pupils equal, no diplopia. Vision = 1. The ophthalmoscopic examination revealed no clear sign of choked disc, and yet the comparison of the pressure showed the presence of a fairly high intracranial hypertension. This patient was reexamined three months after. At that time he had homonymous diplopia: The pupils were equal but the iridian reflexes sluggish. There existed a strong bilateral choked disc.

This caused the doctor who was treating him to make a lumbar puncture, and a few days later a second one. The examination of the spinal fluid was negative. But the choking increasing, a subtemporal trepanning was decided on.

This operation was followed by an extraordinary sedation of the symptoms for a period which lasted about three weeks, then the headaches began again. A lumbar puncture made them disappear. Finally the patient was entrusted to Dr. Salomon for treatment by X-ray. He underwent 12 sessions of irradiations. This time the improvement persisted. An examination of the eyes was carried out two months later. Vision was normal, the diplopia slight and only in certain positions of the head. Per contra there still existed considerable choked disc and yet the formula of the pressures had become normal again.

This patient was kept under observation for a long time. It was only at the end of four months that the choked disc appeared to diminish, the formula of the pressures was still normal. The patient had resumed his occupations. One year after trephining the cure had persisted, the patient considered himself cured, there was no longer any sign of intracranial hypertension, except the ophthalmoscopic image of a choked disc in very slow regression.

This observation shows therefore that the intracranial hypertension had been revealed at the first examination

of the patient and that three months later it showed a considerable choked disc. On the other hand the ophthalmoscopic image of the choking remained for many weeks after the disappearance of the intracranial hypertension, as is shown by the arterial pressures.

This persistence of the modifications of the disc, in spite of the disappearance of their causes, is a fact which Thorner has attempted to explain by assimilating choked disc to inflammatory edema. For him the increase of the intracranial pressure and the choked disc are due to toxins; the choking is merely a toxic edema, an optic neuritis. We will not dwell upon what is open to criticism in this conception.

For Dupuy-Dutemps, the choking is due to the compression of the central vein of the retina, during its passage across the optic subarachnoidian cavity, distended by the fluid. If there is absence of choking in tuberculous meningitis, it is due to the partitions and adhesions which hinder the penetration of the fluid into the optic sheaths.

According to Schieck, the choking is the visible expression of the spinal fluid having accumulated in the optic subarachnoidian cavity. The fluid ends by insinuating itself into the connective tissue cavities which surround the central vessels. This infiltration would explain the swelling of the disc. If the edema regresses it is always the central zone of the disc, that which surrounds the vessels, which resists the longest.

Of these three opinions that of Schieck appears the most attractive to us, because it explains many clinical observations and the return to a normal formula of pressures in spite of the persistence of the disc edema.

Before closing these pathogenetic considerations, we have a few remarks to make about a very curious phenomenon which is related in observation of case 4. We refer to the hypertension which succeeded very rapidly the second lumbar puncture. The fact in itself may appear unusual. It has however been reported by Guillain and we consider it very interesting on account of its resemblance to what is observed in the eye.

The eyeball possesses its own tension, which oscillates between 15 and 20 mm. Hg. When the anterior chamber of a normal eye is punctured the tension of this eye falls to 0. But this eye recovers very rapidly its original tension, goes beyond it after a few oscillations more or less, and returns, in man, in two or three hours to the tension it possessed before puncture.

Now, there is on the other hand similitude from the chemical point of view between the aqueous humor and the spinal fluid: they are dialysats of the blood. The ocular fluid fills the ocular ventricle (anterior chamber) and imbibes the vitreous just as the spinal fluid fills the cerebral ventricles and the ependyma. Now, in the eye, the cause of the reactionary hypertension appears indeed to be the decompressions which causes hyperemia. This cupping action, imputable to the puncture is evidently more manifest in the eye, because the ocular liquids are stored up under a greater pressure than the spinal fluid. The cavities filled by the latter are moreover larger. It is true that they are often very much divided up. May we not therefore think that this partitioning often masks a phenomenon which for the lumbar puncture should be, as for the eye, considered as habitual? Evidently the height of the general arterial pressure should likewise be taken into account.
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BAND KERATITIS.

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The thin layer of opacity involving Bowman's membrane and adjacent tissue may be secondary to serious disease and degenerative changes in other parts of the eyeball. This is the more common form. It should not be subjected to operation. In a few cases at rather advanced age such a film is seen in eyes otherwise healthy. This primary form of band keratitis is suitable for operation, removal of the film, which restores useful vision. Cases are reported in one of which operation as described was resorted to with excellent result. Read before the American Academy of Ophthalmology and Oto-Laryngology, September, 1926.

The deposition of calcareous salts in Bowman's membrane is common. When the deposit is in the form of a ribbon, it is called "Band Keratitis" and is observed in two forms, the primary, which is rare, and the secondary, which is frequently seen.

Few articles have appeared in English literature since the disease was first described by Dixon in 1848 as "a curious form of opacity depending upon spontaneous deposit of earthy salts between the epithelium and the anterior surface of the cornea," and referred to by Bowman in the following year as "a symmetrical opacity of both corneae, extending horizontally over the central region and obstructing vision; consisting of an earthy deposit limited to the anterior elastic lamina." He further stated, "I am not aware that these are particularly described in books nor whether they admit of removal or even arrest. They are probably connected with an imperfect nutrition of the eyeball and must be left to take their course."

Graefe in 1869 described band keratitis in the discussion of the pathology and treatment of glaucoma. This was followed by many papers including those of Nettleship in 1879, Leber in 1896, Usher in 1890 and Suker in 1900.

One type of this disease, the secondary, follows chronic iridocyclitis, advanced glaucoma, or intraocular affections, as a result of which the patient has lost sight. The other form is primary and not associated with any other ocular disease. It is well to have a clear conception of this clinical entity and not include every palpebral fissure opacity as band keratitis. Suker discussed the disease and proposed the name "Keratitis Petrificans," as a distinctive, comprehensive term. De-

posits may follow an inflammation of the cornea and are usually between Bowman's membrane and the external limiting layer. The typical opacity varies in color from silvery-white to gray-brown. One author has described it "as appearing like dirty ground glass viewed from the unground side." It is a resistant layer, like the glaze on china, in appearance and feel.

SECONDARY BAND KERATITIS.

When this corneal opacity is associated with an intraocular infection, it is secondary to it. The difference between secondary and primary "band keratitis" is based on the history and the physical examination of the parts affected, including the slitlamp procedure.

The secondary bands are well illustrated by two patients. It was partial in the case of H. H. a twenty-five year old male who came to have a cataract removed. For three years his left eye had been sore, and for two years blind. In addition to a secondary gray cataract, he had several isolated areas of corneal opacity. Four years later, 1926, the opacity had increased so as to suggest the distinct lines illustrated in the drawing. There was a wavy line at the lower palpebral fissure, from which there was an upward extension on the temporal side. Under the slitlamp, the epithelial surface over the infiltration was smooth. Directly beneath it was a whitish mass, consisting of a thin layer in which there were many rounded black appearing areas, the characteristic appearance of the disease under discussion.

The complete band is well shown in a case reported at the American Ophthalmological Society in 1925. This was a case of absolute glaucoma in a sixty year old woman, who had been blind

for several years. There was an ovoid zone of gray infiltration, roughly corresponding to the palpebral fissure. With the slitlamp, the vessels at the limbus were distended, with loops which extended into the superficial cornea, above and to the outer side. There was nothing noteworthy in regard to the bloodvessel walls. The entire corneal surface was stippled. In the oval area of infiltration two grossly visible bullae were seen as a collection of fluid in the epithelial layer. One was somewhat quadrate, with five irregular wavy elevated epithelial line extensions; the other a cord of epithelial elevation, with most of the fluid collected in an oblong space, altho there were traces of it in the raised tube which extended from each end of the bulla.

Beneath the epithelium and Bowman's membrane were two definite kinds of infiltration; the more anterior area was white, and suggested a thin calcification layer. The meshes were large and the framework flat. The effect was that of holes punched out of white paper. The other opacity was deeper and had a wavy outline, like filamentous threads, which extended into the various layers of the stroma. These changes were similar to those usually found in any type of band keratitis, whether a narrow arc at the limbus, or a definite ribbon occupying a major portion of the cornea.

The primary form occurs, as stated, in an otherwise healthy eye, usually in elderly people and most frequently in those exposed to irritation, such as dust or certain chemicals. It is characterized by a progressive extension of opacity most often beginning as small flakes near but not at the limbus, in the palpebral fissure. Occasionally the opacity may be seen as an isolated speck. It is essential to remember that the process may never go on to the formation of a distinct band, but may remain as a more or less isolated arc.

Mrs. S. T. complained of a progressive decrease in vision for the last twelve years, with lacrimation for the past three weeks. Vision of the right eye was 20/50 and there was an irregu-

lar band of lace like opacity, which extended across the cornea. The left eye had vision 5/200, with a similar but denser band, which extended from about one-quarter of a mm. inside the limbus across the cornea, with its widest portion over the pupillary area. It consisted of many gray and white layers with several small distinct black holes some of which were round, others oval. As there was no other pathologic change in either eye, she was advised to have the film removed. No one whom she consulted would agree to the operation and, altho first examined in 1922, she has, as far as we know, had no operative intervention.

PRIMARY BAND KERATITIS.

As primary band keratitis is not a common disease, the following case history is reported with the expectation that the condition will be more often recognized and the operation proposed be more frequently performed. Mr. W. H. a strong, vigorous retired New York police captain, seventy-one years of age, came after having seen "a lot of doctors." Among the list were many of experience and great skill, some of whom said they had never seen his kind of an eye, and one said nothing could be done to materially help his sight.

He was first examined on the 9th of April, 1925. Right eye vision 6/200. He had a broad band of gray opacity extending across the cornea, with the exception of a narrow clear zone between it and the limbus. With his partly closed eyelids this band 4.8 mm. wide occupied the exposed portion of the cornea. This was widest in the periphery with a convex margin toward the apex, corresponding to the shape of the eyelid when it was in apposition to the cornea. The lower margin was also curved like the lower lid. There was nothing abnormal in any other part of the eye. Pupil 3.5 mm. responding promptly to light. The iris was of good color, the pupillary area back of the iris clear. The gross appearance of this band was that of a network of grayish fibers, with spaces, which looked black, because of

the contrasting absence of infiltration. These comparatively clear areas were oval and round, conveying a definite impression of holes punched out of a gray sheet.

Left eye, vision 6/200. The condition of the eye was practically the same as the right. A grayish band similar to that on the right extended across the cornea.

On the 5th of November, 1925, he entered the Albany Hospital, and the right eye was operated upon. There was practically no reaction. Four days later, November 9th, the left eye was operated upon. He left the hospital on the 15th of November. When last seen on the 8th of January, 1926, the vision of the right eye was 20/30 and Jaeger 1. Vision of the left eye 20/30

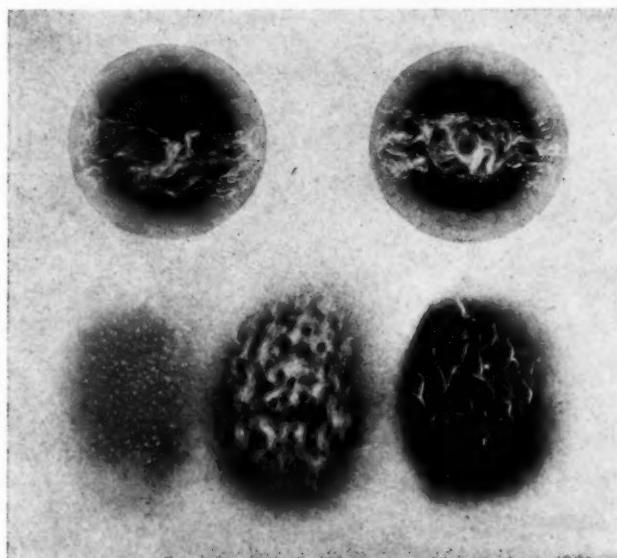


Fig. 2.—Bilateral band showing its typical location and characteristic gross structure. (a) The stippling as seen in the indirect light. (b) The infiltrated zone with the characteristic rounded, black appearing areas. (c) The fine fibrillation on the posterior surface of the infiltration.

Under the slitlamp, in indirect light, there was a definite stippling of the epithelial surface. There was a continuous sheet of opacity with several rounded, pigmented masses anterior to the network. The infiltrated zone was anterior to the corneal nerves. With direct light, the network was definite with the irregular channels. At the junction of the lines of infiltration there appeared black dots, which were in reality clear areas. There were also many rounded and oval black appearing spots in this gray sheet, over which the epithelial layer was distinctly hazy, indicating that the infiltration was probably deeper than Bowman's membrane and some of it in the superficial stroma. On the other hand, the clear areas may have been uninvolved Bowman's membrane.

and Jaeger 1. With the slitlamp, there was an irregular edge where the fragile layer had been cracked off of the remaining sheet. The corneal epithelium had reformed, leaving a clear glistening surface. The eyes were quiet. By letter in August, he reported complete functional recovery.

Operation: The patient enters the hospital the night before. The eyes are washed with boric acid solution, and a drop of 25% argyrol instilled. In the morning he is given the same preparation, and when he arrives in the operating room one drop of 4% cocaine is dropped over the cornea every two minutes for six drops. The eyelids are scrubbed with green soap, the eye thoroughly flushed with boric solution. An ordinary lid speculum is placed and the eyeball held firmly with strong

fixation forceps, is turned to the nasal side.

A very sharp, small scalpel is used to start the dissection which should be begun near the temporal limbus, preferably just to the outer side of the calcified zone. The first incision should go thru Bowman's membrane. If the film is too hard and the knife only scratches its surface, it will be necessary to crack a small piece off. Then, in the partially clear area, a thin silver spatula or a special curette is steadily, but gently,

or no injection of the globe, no pain and usually no discomfort. The eye is irrigated once a day and the dressing reapplied. If the stroma has not been damaged, healing is complete in a few days; and glasses may be adjusted within three weeks, and the patient use his eyes without restriction.

Thru an unfortunate circumstance, we are unable to present the section of the material removed. The specimen was taken to the laboratory, stained and examined but found to be

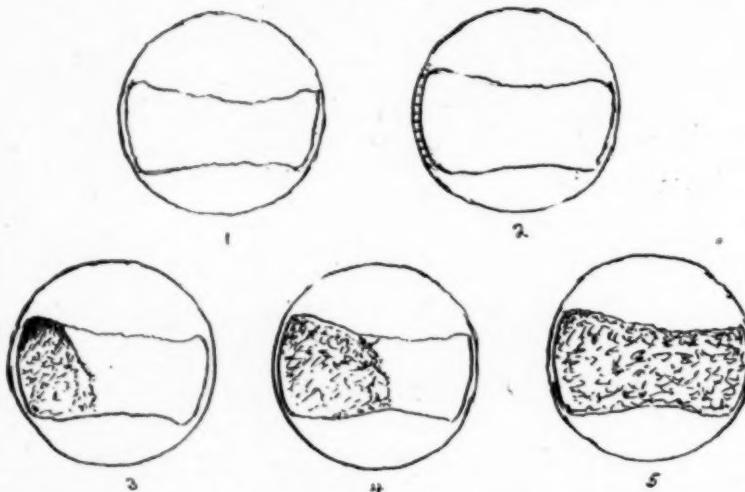


Fig. 2.—A schematic representation of the detail of operation. 1.—The outline of the band. 2.—Primary incision thru Bowman's membrane illustrated by dots. If the calcareous layer is too resistant a small piece is cracked loose. By rocking the knife from side to side, it is easier to free the layer and proceed with the dissection. 3.—The first mass lifted by the spatula. 4.—The advanced stage of the operation. 5.—The band completely removed.

forced between the calcified layer and the clear underlying cornea. If the fragile layer cracks it is only necessary to carefully insinuate the spatula beneath the broken edge and lift the shell from its base. The layer is almost certain to break, so that the edges are irregular; but, by using sufficient, well-applied force, the entire band may be removed. The essential to success is the clean removal of the opaque layer, without injury to the underlying clear cornea. If, after the major portion of the film has been removed, small gray specks remain in the pupillary region, they should be lifted off.

Following the operation the eye is washed with boric solution, atropin instilled and a compress bandage applied. Healing is uneventful. There is little

so thick that good photomicrographs could not be made, and in the attempt to make the section thinner, the whole specimen was destroyed. Dr. Jacobson's report follows:

MC: "A piece of white membrane, irregularly triangular in shape, about 1x.3 cm. in size and of paper thinness. It is too thick for examination by transmitted light unstained, and too thin for ordinary histologic sectioning. It is fixed in 50% alcohol and stained with hematoxylin and eosin. This shows it to consist of a mosaic of flat epithelial cells, the layer being about three cells thick and supported by a delicate fibrous membrane. The individual cells are separated by a narrow zone of intercellular substance, which stains blue with hematoxylin

and which may indicate the presence of soluble calcium salts. No insoluble calcium salts present. In trying to rearrange the specimen, it broke into many fine pieces, which prevented further study."

In 1909 Wiener presented, before the Section of Ophthalmology at the American Medical Association, a paper on, "Regeneration of the Cornea," at which time he referred to his work on rabbits and described his operation for the removal of corneal opacities. It was my good fortune to see many of his animals and to note how wonderfully well they had healed and how little corneal cloudiness remained. It was the observation of his work that led me to adopt the present method of removing these calcified sheets.

It is interesting at this time to report the case of Mrs. C. F., forty years of age, who was first examined July 26, 1924, at which time there were several small, isolated corneal spots, from which the corneal epithelium was absent. About a year later the epithelium was again separated from the same areas, and some months later she came in with a large bulla. In October, 1925, several fine specks were located with the slitlamp in Bowman's membrane. By December 29, 1925, they had so increased in size that they appeared as real flakes, irregular in size and outline, with the characteristics of band keratitis.

It is to be recalled that Vogt described a horizontal line of altered refraction in Bowman's membrane. This was only seen with the slitlamp, and found especially in people exposed to inclement weather. Such observations may eventually assist in the solution of the problem now confronting us, the cause of the deposit, which chemists and pathologists claim is phosphate and carbonate of lime. Pathologists are all agreed that the basic lesion is a calcification of Bowman's membrane. There is, however, no agreement concerning the cause or the treatment of the condition.

Dixon in his original paper clearly demonstrated the value of operation. His good example has not often been

followed, either by the writers of our text-books or by clinicians. Beard states that scraping the cornea was practiced long before Galen's time. The modern text-books fail to convey the proper impression of either the symptoms of this disease, its prognosis, or its treatment. Some authors suggest an iridectomy. The largest and most often consulted work, the American Encyclopedia of Ophthalmology, states, "So far as treatment is concerned, very little can be expected." It is instructive to read the appendix in Mr. Bowman's work in which the clinical picture of the disease is well described.

The first report of the disease came from England. So did the last one that we found, which was that cited by Mr. Hudson before the Section of Ophthalmology, Royal Society of Medicine, February 9, 1923, under the title, "Two Cases of Primary Band Shaped Opacity of Both Cornea." In one, following scraping of the cornea, the vision of the right eye had been improved from 6/36 to 6/24, and the left from 6/60 to 6/12. The other case had not been operated upon. He found the ordinary sharp corneal spud to be the instrument of choice. His impression was that the opacity was in Bowman's membrane.

From a study of our cases, and from a review of the literature, we are unable to make a statement regarding the causative factor of this disease. Clinically it seems certain that mere exposure to wind, dust, or irritation, is not sufficient to produce it; for otherwise it would be much more common, and the reduced vision resulting therefrom would be much more often observed.

SUMMARY. Band keratitis is primary or secondary. When secondary, it is part of the general degeneration of the eyeball and does not respond to local treatment. When primary, operation is indicated.

The diagnosis is made on the appearance of a gray band in the palpebral fissure, with the presence of what seems to be black holes in the sheet. The differentiation of type is made

after the complete examination of the eye.

If there is no pathologic change other than that in the cornea, it is primary band keratitis. The pathologic change is in Bowman's membrane. The slitlamp confirms the location of the lesion.

CONCLUSIONS: Primary band keratitis, an hitherto neglected corneal disease, should be operated upon; and the operation should consist of a corneal dissection following the lines here suggested.

The primary and secondary forms must never be confused, and a patient suffering from secondary changes should never be subjected to a corneal operation.

We may best close with Bowman's words printed in 1849, after he had described his case, "The issue of my case I am anxious should be known, because there are probably many similar ones scattered over the country, given up as incurable, and yet within the reach of this method of relief."

344 State St.

RECURRENT KERATITIS PROFUNDA FROM MAXILLARY SINUSITIS.

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Explosion of a stove blew soot and coal dust into the eye, this was followed by increasing photophobia, redness and swelling. Return to nearly normal was followed by recurrences. There was deep infiltration invaded by vessels from the limbus. Under treatment, permanent relief was only afforded by radical operations on both antra. Reported from the Department of Ophthalmology, Walter Reed General Hospital.

Those lesions of the cornea usually classed as "keratitis profunda" are perhaps sufficiently rare to justify detailed report of a case, especially when the etiology has been quite clearly determined. The causes usually ascribed to the development of the condition are so varied, that it is probably more of an anatomic than clinical entity.

Among the provocative factors, the effects of cold have been given special prominence, which indeed was the indirect cause of the case here reported. In addition, herpes zoster, tuberculosis, neuropathic changes, and various febrile conditions, e.g., malaria, are frequently mentioned. From the long etiologic list found in the literature, one is led to suspect that their relations were frequently rather "post hoc," than "propter hoc."

The pathology of keratitis profunda has been well presented by Verhoeff, and is apparently due to the action of a diffusible toxin on the anterior portions of the cornea. The changes consist in alterations of the epithelium, with destruction of the corneal corpuscles. Behind the involved area the

corneal corpuscles proliferate, so as to surround the injured portion. Leucocytic infiltration of the stroma is conspicuously absent.

CASE. G. A. N., white, age 27, entered the Eye Service of the Walter Reed General Hospital, October 15, 1925, complaining of an "inflamed left eye."

FAMILY HISTORY. Father died at 73 as result of an accident. Mother, aged 68, and three brothers, living and well. The members of the family were quite healthy, with no history of any form of eye disorders. Patient married, wife in good health; no children, and no history of miscarriages.

PAST HISTORY. Had measles, mumps, whooping cough and pneumonia during childhood. Since 1916 noticed a tendency for crusts to form in the nose. Had tonsillectomy with opening of both sphenoids and ethmoids during 1924, while under treatment for present eye conditions. Had always been healthy and vigorous, but below average weight for one of his age and height. No history of previous eye disorders.

PRESENT ILLNESS. While serving in France in October, 1918, a stove, near which he was standing, exploded, blowing the top off and ejecting a cloud of coal dust and soot, many particles of which entered the left eye. There were several superficial abrasions of the face, but the right eye remained apparently uninjured. These skin lesions healed readily, but shortly afterward, the patient noted his left eye becoming increasingly sensitive to light. This photophobia soon became aggravated sufficiently to require tinted glasses. The vision was gradually reduced, and lacrimation became excessive.

The eye grew rapidly worse, becoming red, swollen and tender to the touch. These disorders he attributed to the injuries received at the time of the stove explosion.

This first attack lasted two months, after which the eye returned to approximately normal. In a short time photophobia again became noticeable, followed by general injection, pain and diminished vision. These attacks continued at intervals ever since, in spite of varied treatment.

Following his discharge from the service in 1919, the patient had spent the majority of his time in government hospitals, and since 1921 the eye had never returned entirely to normal.

For the past year the pupil had been kept widely dilated by atropin. Powdered calomel and dionin were also applied locally, and potassium iodid administered internally. In an endeavor to find the source of infection, his tonsils were removed, teeth X-rayed and one extracted, the ethmoids and sphenoids were opened; but no visible alteration was noted in the condition of the eye.

PHYSICAL EXAMINATION. The patient was a tall, rather slim young man, slightly anemic, with the left eye maintained closed so long that the head was carried far over on that side in order to obtain additional relief from the severe photophobia. The right eye was normal.

Vision, O. D. 20/20 and Jaeger No. 1. O. S. 20/100 and Jaeger No. 13, with difficulty.

The left palpebral fissure was held at little more than slit size. On attempting to inspect the eye, there was severe blepharospasm with a gush of tears when the lids were forcibly separated.

The conjunctiva, both palpebral and bulbar, was chronically thickened, with such marked hypertrophy of all lymphoid follicles, that they stood out in densely packed pedunculated masses.

The cornea was surrounded by a ring of injection, both ciliary and scleral. The conjunctiva at the fornices was also deeply injected. There was no chemosis.

The corneal surface was matt thruout. A triangular area of opacity occupied the inner lower quadrant, two small depressions being present over the denser central portions. No scarring was found that might connect the eye disability with an injury received at the time of the stove explosion.

The ball was not markedly tender on palpation. The tension was normal. The aqueous seemed clear on gross inspection, and the surface markings of the iris were not visibly altered. The pupil was widely but evenly dilated by the atropin, and no remnants could be found of iris pigment on the lens, that might indicate former synechiae.

Within the quadrant shaped area of opacity, the slitlamp showed the cornea infiltrated thruout all its layers, but more densely towards the center. This was a grayish, lace like haze, that faded gradually into the surrounding normal portions. Springing from the limbus were a number of deep vessels invading this area. The infiltrate was diffuse, no punctate areas being seen as in the interstitial form of keratitis.

No deposits were visible upon the corneal endothelium or lens surface. No evidences were found that the iris or ciliary body had ever been involved in an inflammatory process. The aqueous was clear. While examination of the fundus was difficult on account of the blepharospasm and lacrimation, nothing grossly abnormal could be demonstrated.

A thoro physical examination did not aid in determining the source

of the eye irritation. The chest was well shaped, and quite broad for one of his general build. The expansion was good. The note on percussion was normal. Breath sounds were roughened over both upper lobes, but vocal resonance was normal. No evidence was elicited of pulmonary tuberculosis. By X-ray the lungs were reported as negative for parenchymatous thickening or infiltration.

There was moderate pyorrhea. On account of periapical absorption one tooth was reported as bearing evidence of infection, and was immediately extracted. The Wasserman was negative, the urine normal beyond a rather heavy mucus content.

A middle turbinectomy had previously been done on both sides, with crusting and discharge visible at the former sites. The tonsillectomy had given a satisfactory removal of all lymphoid tissue. Both maxillary sinuses were questionable on transillumination. A puncture of the right antrum was done, but as the washing fluid returned thru the lacrimal punctum the effort was discontinued. The left antrum was then punctured, the wash water bringing away a few soft mucus shreds. A later puncture of the right antrum evacuated a small amount of yellow fluid thru the needle. As there was no return thru the normal ostium on injection of water, the impression was given that the needle point was imbedded in soft tissue.

The X-ray reported "maxillary sinuses hazy, the degree of opacity not being sufficient for fluid." The prime importance of all these antra observations was not evident till later.

TREATMENT. As the lymphoid hypertrophy was a characteristic atropin folliculosis, this was immediately discontinued and scopolamin substituted for a short time as a mydriatic. The local corneal manifestations were treated by heat, and dionin in gradually increasing strength sufficient to maintain a distinct chemosis. As the acute symptoms began to subside, powdered calomel was dusted daily upon the surface of the opacity, to hasten the clearing process.

Search for the source of the infec-

tion was immediately instituted. The possibility of lues was first considered, but dismissed as the condition was not clinically characteristic, and the Wassermann persistently negative. Furthermore there was no suggestion of either primary or secondary lesions, and no adenopathy.

Tuberculosis was more difficult to exclude, in spite of the negative physical and X-ray findings. While undergoing these studies, the injection of the eye gradually faded, the photophobia lessened, the palpebral fissure widened, the area of corneal involvement became smaller, and by slitlamp was shown to be decidedly lessened in density.

Within a month the eye was white and quiet, the corneal infiltration and conjunctival folliculosis having almost entirely disappeared. The general health remained excellent. The vision gradually returned to normal, and the patient was entirely comfortable. He was discharged from the hospital December 23, but without any definite understanding having been reached as to the nature or location of the basic lesion.

In celebration of his apparent recovery, the patient took a long automobile ride in an open car, on a day that grew unusually raw and blustery. Within twenty-four hours he was back in the hospital with the eye intensely injected, a large fresh area of corneal infiltration, severe photophobia and pain.

The local applications formerly efficacious were again employed. Realizing the basic focus was still present, the search for it began with renewed vigor. On January 26, the right antrum was washed out, recovering a dense coagulum of mucopus. Two days later the left antrum was punctured, and a small amount of soft mucus came away. The eye condition, in the meantime, had subsided considerably, but was noted to become acutely irritable after each of these procedures.

After a few days this process was repeated, in order to see if the exacerbation of symptoms had been definitely an aftermath of the antra manipula-

tions, or merely coincident. Again the eye became freshly injected, and the subjective symptoms quite aggravated. This association of renewed irritation of the eye whenever the antra were irrigated, gave the clue that caused both to be opened and thoroly cleared of all abnormal tissue.

On account of the severity and duration of the eye symptoms, the radical operation was decided upon, rather than an intranasal opening, which would have been the normal procedure in cases presenting no more evidence of severe pathology. On February 25 a bilateral Caldwell-Luc was performed by Major Robert E. Parrish, M.C. The right antrum was found half filled with a soft polypoid mucosa and mucopus. The left had a small amount of soft pedunculated polyps, but no liquid contents. These were upon the nasal wall only, the roof and outer wall being normal.

On removing the packing March 1, there was severe hemorrhage from the left side. Efforts to control this by packing thru the nose having failed, a postnasal pack was applied and the supporting cords tied over a sponge closing the nostril. This was removed March 3 without the bleeding being renewed, and recovery was without further incident.

A review of the case shows that while pathology was recognized in the maxillary sinuses, it was not clear at first that this was of a degree sufficient to be identified as a causative focus in producing the eye lesion. Similar sinus findings, with no demonstrable associated abnormalities, are so frequent that we have grown to regard remote results as only derived from those having fetid, purulent contents. In the present case the usual methods of examination gave little evidence of the real extent of pathology present, and it was the observation of the eye reactions on each occasion of entering the sinuses, that led to the radical operation. The amount of tissue pathology found was unexpected, in view of the minimal indications given by transillumination, X-ray and lavage.

During the short but rather stormy convalescence, there was no form of

reaction on the part of the eye. All local treatment was abandoned. The remnant of the infiltration quickly cleared, the cornea becoming entirely normal with the exception of a small vertical line about 3 mm. long at the lower limbus. The two areas of depression disappeared completely, and by slitlamp no evidences were noticeable of the previous infiltration beyond faint outlines of the formerly invading vessels. The vision was normal, for both near and far. The patient was discharged May 4, with the eye entirely normal for the first time since the original attack in 1918.

If any conclusions are justified from the single case presented, they might be thus summarized:

1. "Cold" can cause keratitis profunda, altho its results are produced indirectly thru sinus infection that the cold or exposure aggravates. If "cold" per se could give rise to these pathologic changes, one might reasonably anticipate keratitis profunda to assume almost epidemic proportions among those exposed to low temperatures each winter. However the condition is so rare, that in addition to exposure another factor is necessary. This can be supplied by a chronically infected sinus.

2. The clinically demonstrable evidences of sinus pathology sufficient to produce an aggravated keratitis profunda, may be surprisingly little.

3. In searching for focal infections of this nature, it is preferable to attack one point at a time. If this manipulation is followed by an exacerbation of the distant symptoms, their interrelation is probable.

4. When such a focus is found, palliative measures may do little more than stir up the toxin absorption, thus tending to aggravate the distant lesion. The entire septic area must be eliminated, following which the cornea will clear spontaneously. Local therapeutic measures are of minor importance.

5. After eradication of the septic focus, regeneration of the cornea progresses rapidly to the point grossly indistinguishable from the normal.

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REFRACTION UNDER CYCLODAMIA.

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Cycloplegia is not always available for measurement of refraction. As substitutes many ways of controlling accommodation have been used. The convenient, effective association of these is here described, as a method of more accurately testing refraction without a cycloplegic in cases to which it is applicable.

Refraction of all patients under a cycloplegic, however desirable, does not seem to be practicable. How can such refraction work as has to be done otherwise be made most accurate? Is reasonable accuracy without a cycloplegic possible, and if so, what are its conditions?

That accurate refraction in general demands control of the accommodation is evidenced by the wide use either of cycloplegia under which control is complete, or of fogging and analogous optical measures under which some control is obtained, as well as by the tendency to discard manifest refraction because of its entire lack of control. The methods of partial control as generally used, when unsatisfactory, are largely so because the amount of control they afford is too small, too uncertain, or too variable. The chief condition requisite for accurate refraction without a cycloplegic would therefore seem to be an amount of accommodative control reasonably close to that of cycloplegia, or at least as near to that as can actually be reached without drugs.

It has seemed to the writer that this condition might perhaps be most nearly attained, by extending and developing the various measures of partial control, and by combining them into a refractive method in such a way as to bring and hold the accommodation under all the control possible, until the lowest limit of its variability is determined. The unknown amount of accommodation below this limit would then always be the smallest possible without a cycloplegic, and might well be small enough to be relatively unimportant. This paper is a study of such a method of refraction as developed and practiced by the writer, in which (a) the accommodation is forced or invited towards relaxation by various optical measures during the entire examina-

tion; and (b) the watched for moment of greatest relaxation is noted, as the nearest practical approximation to cycloplegia. For this method the name of Refraction under Cyclodamia, subdued or overpowered accommodation, (damnao, I subdue or tame), is suggested, from the way in which the accommodation behaves and from the amount of control usually obtained.

The inception of such a method was suggested to the writer by a remark of the late Dr. F. M. Wilson that, "the most important thing in all noncycloplegic methods is to judge what the ciliary muscle is still doing." This led to a study of the methods of accommodative control, as then used, and their limits as measured by a cycloplegic. In a subsequent refraction, in each case, an attempt was made to see how close to the known cycloplegic measure the limit of control could be pushed, if skiascopic and fogging methods were varied for this special purpose. Such variations were devised and proved useful tho tedious, and during some years of trial in the refraction room at the Manhattan and the Infirmary in New York underwent considerable change, in the way of simplification to essentials. And when the draft examinations necessitated so large a number of refractions, that cycloplegia was often out of the question and a rapid but, roughly dependable method was badly needed, a combination of these earlier developed and simplified control measures was tried out and found to answer the purpose. It soon became evident that the combination of control measures was much more effective than the same measures singly; so much so as to practically amount to a new method, which has developed into the method of Cyclodamia as now practiced. Once having learned to set the stage for so different a type of examination, the ex-

amination itself was neither difficult nor tedious; and the rapid approximation of the total error obtained in this way was sufficiently accurate to replace that obtained by cycloplegia in many office cases, as well as in draft and clinic work; provided that the same judgment and care in details were used in determining the glass to be prescribed from this approximation as from cycloplegia, and that cases in which material relaxation was not obtained were excluded.

The type of refractive method here described under the name of Cycloidamia is not altogether new, since several other men have devised personal methods along similar lines. But so far as the writer knows, it has not hitherto been given a distinctive name and clearly differentiated from manifest refraction with fogging, with which it may be readily confused since many of the measures used are common to both methods. Such confusion must be avoided, however, or the measures of control will not be used so continuously and consistently as is necessary for real accuracy, and only fogging instead of cycloidamia will be obtained. Nor has this type of method as yet been worked out and described sufficiently, to attract the attention and invite the general discussion and trial which its results seem to warrant. For this reason the writer's methods are submitted in some detail, as a contribution to the better understanding of cyclodamic refraction and its further development.

A brief description of the writer's variations from the ordinary routine of cycloplegic refraction to refract under cyclodamia, will perhaps best illustrate some of the ways in which the principles and methods of the latter may be applied to the measurement of the refractive error, as well as afford opportunity for comment upon the more common causes of inaccuracy in its use.

1. The first stage in any refraction is the examination of the media and fundus, to learn if one is measuring normal eyes. This does not differ in cyclodamia, but should include a rough

mental estimate of the refractive error and of what the eye should see with correction, as well as the recognition or subconscious exclusion of any eye disease. The latter is no small part of the ophthalmologist's service. Many people seek glasses for the relief of eye symptoms, whatever their cause, when their need is for diagnosis, treatment, instruction or advice, instead of, or in addition to glasses. In the lack of medical training, which would enable him to detect the unsuspected beginnings of disease while there was yet time to head it off, lies the optometrist's greatest menace to the community which he has taught to call him Doctor.

2. The second stage is the measurement of the best distant vision obtainable, which is best made with both eyes wide open. This is recorded as the vision of the better eye. If on covering the eyes alternately one eye sees better than the other, the vision of the poorer eye when the better is securely covered is observed and recorded. As has been pointed out by Dr. Key and others, this gives a more dependable record of what the patient naturally sees than is obtained by testing each eye with the other covered; especially in low myopia where it favors ciliary relaxation. It is often a little difficult to get children to read the chart as far down as they really can; some adults also do not try to read beyond what they can see easily and very clearly; encouragement is required and sometimes even considerable firmness and patience; and one must always make sure that both eyes are wide open, not partly closed to improve vision. For these reasons visual records made by assistants are often uncertain, unless the assistant has been carefully trained.

If one can really depend upon the record of best distant vision, certain valuable and time saving inferences may be drawn therefrom. The most obvious of these is that $V = 20/20$ or better excludes any myopia whatever. Also that $V = 20/200$ excludes myopia over 1.50, unless the pupil is very small, and suggests amblyopia, or low myopia,

as hyperopes and astigmatics, unless old, usually see better than 20/200.

In refracting under cyclodamia, especially in low degrees of hyperopia and astigmatism, and in ignorant patients, distant vision is often best taken only after the measurement of the refractive error has been completed; otherwise the patient's accommodation may be excited thereby, and the remembrance of what he could see without glasses may also interfere with his trying to read the chart later, with over-correction.

3. The ophthalmometric examination has no special variation in refraction under cyclodamia, tho its accuracy and dependability is of very real importance. Many refractionists do not use the ophthalmometer, depending entirely upon skiascopy and the astigmatic charts. In the opinion of the writer this does not save time, and is unwise, now that really dependable instruments are available. In the majority of cases, especially in young people, astigmatism is entirely corneal, and the subjective examination is the more apt to be exact the more closely it agrees in axis and amount with an accurate ophthalmometric record, checked by skiascopy. In corneal opacities skiascopy is often doubtful. In other cases the record of what part of the total astigmatism is corneal, and what part is lenticular, and therefore perhaps in part at least is accommodative and compensatory to the corneal astigmatism, should be carefully considered before ordering cylinders. Likewise any variation in the axis found by skiascopy, or the subjective examination, from that of the corneal astigmatism shown by the ophthalmometer, should be considered from the same point of view. Both of these are more important when no cycloplegic is used.

4. In using cyclodamia in skiascopy, lenses in the trial frame over both eyes are employed, rather than lenses in batteries, or instruments covering one eye only, which have a tendency to increase accommodative effort. During the entire skiascopy the patient must fix a distant object, since if he fixes the light or any part of the examiner, he

is using a diopter or more accommodation. This object should be about in the line of the examiner's eye, ten feet or more distant, and should have form enough to be readily recognizable even when blurred, so that the accommodation may be coaxed to relax in order to see it more clearly. A carefully drawn cross, or a suitable picture of some size, without detail requiring sharp vision, serves the purpose well.

The room must not be too dark for the object fixed to be seen, at least in outline. The dark room as ordinarily arranged is too dark for this, and one must therefore learn to use the retinoscope in a moderately darkened room. This presents no difficulty if the source of light is sufficiently bright, has an adjustable diaphragm, and is moveable close to the patient's head. Presbyopic examiners should wear glasses adjusted for the distance at which they use the retinoscope, or should have such a lens attached behind the instrument in order to note shadows accurately. Such glasses should be flat, not toric, so that the mirror may come closer to the eye; and the mirror is best made with a hole thru the glass, not merely thru the silvering. As in any skiascopy one must see that the line of light is always perpendicular to the lens surface to avoid confusing errors, and that central pupillary shadows only are noted, ignoring the more easily seen peripheral ones. If the pupil is too small it should be dilated, but it should be remembered that skiascopy, as well as vision, is more accurate with a medium pupil than with a fully dilated one.

A good skiascopic routine is to put into the trial frame the convex cylindrical correction for each eye indicated by the ophthalmometer, convex spheres which, from what is known about the case so far, will surely over-correct any hyperopia likely to be present, and +1.D. spheres for the working distance of one meter; and to retinoscope, changing spheres as necessary to approximate correction, then changing cylinders if necessary, until one is satisfied that the skiascopic record is as accurate as he can make it.

In some cases, especially with small pupils, instead of adding +1.D. for one meter distance, it is easier and one sees better to add a +1.50 D. and work at the corresponding distance of two-thirds of a meter, i.e., at about arm's length, as has been suggested by Dr. Jackson.

Not infrequently during the course of such a retinoscopy, especially as one approaches the point of reversal from overcorrection, the patient's accommodation suddenly relaxes further, giving marked "motion with," and indicating of course still more hyperopia. When one changes to stronger spheres this extra relaxation often disappears; it may in fact be momentary. It should be watched for however, and the greatest amount of hyperopia found at any time during the skiascopy recorded as the total amount; in some cases this is much more than is found at the trial case, or in any other way except with a cycloplegic. More reliable results are obtained by starting with too strong spheres and working from "motion against" to reversal, and more hyperopia is thus elicited, than in working from "motion with" to reversal; and when reversal is apparently obtained one should try stronger lenses and see if more relaxation cannot be obtained. As one approaches correction, retinoscoping from nearer or from farther than the usual distance gives a quick hint as to the amount of lens change needed, and so saves time and too many changes. With practice the time necessary for dependable skiascopy under cyclodamia becomes very much reduced; as one learns to control the factors, get and maintain relaxation, and come to an approximation quickly.

5. If the examiner has been successful in obtaining what he believes to be good accommodative relaxation during the skiascopy, and can depend equally upon his skiascopic record, he has a fairly close approximation of the total error of refraction. He now comes to the trial case in pretty much the same position as one who has determined the total error under a previous cycloplegic, and has only to

determine how much correction of that error the patient can be made to wear with comfort. If, however, he is not sure that he has as yet obtained real relaxation (and it is not always easy, nor sometimes even possible), he may often obtain it at the trial case by variations of fogging and fatigue.

There is perhaps more miscomprehension as to the purposes and use of fogging and overcorrection methods, by both doctor and patient, than of any other methods in refraction. Patients seldom understand them, their interest being only in what will let them see, and they not infrequently jump to the conclusion that the examiner has made a mistake, or does not appreciate how blurred their vision is. Unless the examiner can correct this impression by making the patient understand in some manner either the purpose or the necessity of the method, or the patient has sufficient confidence in whatever the examiner does to make this unnecessary, full cooperation will not be elicited and the method will therefore fail of its purpose. The examiner, too, should appreciate not only that fogging methods are designed to coax the accommodation to relax, but that this is more successful when the vision is somewhat, but not too much, blurred, (20/40 to 20/200), and when *both eyes* are allowed to participate to some extent in the act of vision. He should appreciate that the determination of the strongest glass with which the patient can see well, is only *part of* the information available by such methods. The determination of the strongest glass with which he can see 20/200, at which point some patients use very little accommodation, regardless of the amount habit makes them use when seeing 20/20, will sometimes give more real information as to the full amount of refractive error than can be obtained in any other way. The examiner should also remember, that in changing lenses while overcorrected it is usually wise to put in the new lens before removing the old one, or to cover the eye while making the change, so as not to allow the patient to see without too strong a lens, even

for the instant of changing, lest the accommodative relaxation, which he is trying to maintain or increase, be lessened thereby.

Most of the variations of fogging methods described in the literature are useful in cyclodamia under the conditions just mentioned, otherwise they may be confusing. The writer's chief variation which he has not seen used elsewhere, is based on observations made during the draft examinations, where it was found that the average myope of 0.50 should read about 20/40, one of 1.D. about 20/100, and one of 1.25 to 1.50 about 20/200; also that if a plus sphere of 0.50 is added to an emmetrope, or to full correction, it reduces the vision to about 20/40 while +1.D added reduces it to about 20/100; and +1.25 or +1.50 added reduces it to around 20/200. These observations are in practical accord with those of Thorington and others. Since we retinoscope at two-thirds of a meter with +1.50 added as correction for that distance, we have the patient try to read the chart wearing the retinoscopic correction without removing the added +1.50.

If he reads 20/200 with this with effort, it is evident that ciliary relaxation under these conditions is in practical agreement with the skiascopic record. If he reads less than this we have either made an error and have overcorrected, or he is using more accommodation than he did in the dark room, and after a moment he should relax again enough to see the big letter. If he reads more than 20/100 he was using more accommodation in the dark room than he is now, and has more hyperopia than our skiascopy indicated, the amount read beyond 20/100 giving a quick rough measure of the extra amount. It is surprising how many patients will read perhaps 20/40, indicating about a diopter more hyperopia than was suspected from careful skiascopy. Many of these will not accept correction of this amount at once and read 20/20 or 20/15; but that they really have it may be proved by a cycloplegic, or by their accepting it readily a year or so later. Patients do not like to try to read with this

amount of overcorrection; the chart is of course much blurred and they are confused and sometimes a little dizzy. But if they are made to feel that such examination is important, and are encouraged and made really to try, the accommodation often relaxes under the unusual conditions.

Having thus determined the strongest glass with which the patient can read 20/200, disregarding for the moment whether with one or both eyes, it is probable that this is about +1.50 overcorrection. We now come down a diopter to probable +0.50 overcorrection over both eyes; he should then read 20/40 which is the average vision for a myope of 0.50. If he reads better than this his accommodation has relaxed farther or he is trying harder to make out the letters. If he reads worse than this his accommodation is again more active but may relax after looking away for a moment. The patient is now left for a few minutes reading 20/40 with a probable +0.50 overcorrection over both eyes while notes are recorded or another patient seen or perhaps one is called to the telephone. Sometimes when one returns he reads 20/20 with the same glass. If not, we come down by 0.25's till maximum vision is obtained by change of spheres.

The figures quoted in this section are perhaps not quite exact, but are sufficiently so to serve as a concrete example, for the sake of clearness. The important thing to appreciate is that manipulation of the accommodation in some such ways as these, almost always gives us some information which we are otherwise apt to miss, and not infrequently brings out an amount of hyperopia up to this point totally unsuspected. Unfortunately, however, not always; the accommodation may remain consistently active, and never afford a hint as to how much hyperopia it conceals. In such cases the lack of correspondence between the symptoms and our findings will lead us to use a cycloplegic; such cases, however, become less and less frequent in proportion as we master these methods of forcing accommodative relaxation.

The entire examination so far has been with both eyes open, with over-correction over both eyes coming down by degrees to full correction for the eye which sees best under these conditions, the other eye being so far disregarded. If the eyes are not exactly alike, the better seeing eye is now partly suppressed by adding +1.D or more (sometimes +0.50 is enough), and the correction for the second eye obtained in the same way. It is not uncommon that the accommodation of the eye (usually the poorer), will relax more than that of the other on the way down from +1.50 overcorrection, though they seem alike at the bottom. This should be noted, as the amount of hyperopia in the more relaxed eye is often the real amount of hyperopia in both, tho it may be wise in ordering glasses not to disturb the balance between the eyes, and to make the hyperopic correction alike and that of the less relaxed eye. Assuming now that the spheres are correct, we vary the cylinders slightly for amount and axis on each eye while the other is partly suppressed by a strong sphere, or is covered, using either letters or the astigmatic chart, or both. When satisfied, check first for balance between the eyes and comfortable vision, and finally check again for the possibility of increasing the spheres without reducing vision, as the fatigue of the examination often tires the ciliary muscle so that it relaxes still more. Fatigue does not always act this way, however. In some cases it seems to increase ciliary muscle activity, or to make it irregular, so that the longer the examination the less sure you are of its correctness. One has to use judgment, and sometimes stop unsatisfied, to reexamine another day.

The refractive error recorded in this examination is the maximum plus that gave maximum vision, at any time during the examination, with notes of more, hinted at by other parts of the examination (e.g. skiascopy), if such were the case. It is our custom to order for adults as much of this as we think we can get them to wear, and for children in proportion to their age

and to the amount they use their eyes for close work.

6. In the whole course of the examination one should try to make each step accurate, so that it can be depended upon without being done over; to obtain and maintain as much relaxation of the accommodation as possible, and note its limit; and to check results at all times, by apparent discrepancies or inconsistencies in the record. Some of the latter are simple but should not be overlooked. One notes unconsciously whether the eye does or does not see what the examination of the media suggests that it should; and whether the measure of the refraction is compatible with the record of distant vision; e.g., if one finds myopia of one diopter with 20/30 vision, there is an error somewhere. Is there an adequate explanation of any discrepancies between the ophthalmometric record and the cylinders one has decided to order? Was there any marked difference between the record of the skiascope and that of the trial case, and if so, why? Have the inconsistencies in the fogging and fatigue record served to clear the mental picture of the real amount of error, and given a hint as to the amount of accommodation in use for distant vision?

Other discrepancies sometimes occur. For example, it is a curious fact that some patients will see say 20/30 with +2.D but will not see 20/20 or 20/15 surely until we come down to perhaps +1.D. This may indicate that the habit of the ciliary muscles to participate in the act of sharp distant vision is so strong as the result of necessity to overcome their uncorrected hyperopia, that they will be very uncomfortable with full correction, and it may be wise to give it to them by degrees. A variant of this type is the patient whose vision under full correction comes and goes, one moment perhaps being 20/40, and the next after looking away for a moment, perhaps 20/20, and in a moment 20/40 again. Another discrepancy occurring especially in young presbyopes, is that a greater addition to full distant correc-

tion is required to bring the near point up to nine inches, than the age of that patient on the average requires. Except in cases of partial paresis of accommodation, which is not common, this is a very strong hint that the full hyperopia has not been elicited, as the addition required varies pretty constantly with the age. Other examples might be given. Perhaps these are enough to bring out the point, that every bit of information we can get, particularly that which is unexpected or which does not at first seem to fit into the picture, may be useful in checking the correctness of our measure of the refractive error.

7. In ordering glasses, if one is fitting closely, as is especially necessary in patients approaching the presbyopic age, it is often wise to prepare the patient mentally for some discomfort at first, at least for blurring for far distance and in poor lights. But if the glass ordered is somewhat less than the strongest with which at some time during the examination the patient got maximum vision, the eyes should relax to make it comfortable after a few days wear. The patient's confidence in the doctor may be taxed by those few days, however, unless forewarned. Also, in fitting closely, it is usually wise to measure and prescribe the pupillary distance, as few patients will be comfortable with full correction, unless the lenses are properly centered in front of the eyes, as well as fit closely at the proper height and angle. Few opticians can be trusted to insist on exact P. D. without the insistence of the doctor, especially if the patient picks out an expensive mounting which does not quite fit.

Rerefraction, under cyclodamia is also a most effective check on the correctness of one's refraction under cycloplegia, and may well replace the ordinary postcycloplegic examination. Unless opportunity for the latter is to be surely afforded, cycloplegia should not be used.

SUMMARY OF CYCLODAMIA. In the experience of the writer, reliable refraction under cyclodamia requires:

1. Exact observation and record, not only with the retinoscope and trial case, but also in the earlier stages of the examination in which the accommodation plays a smaller part.

2. The use of each bit of information as it appears, especially inconsistencies in the record of the different parts of the examination, as a check on general correctness.

3. (a) The use of such methods as will constantly coax the accommodation to relax, without ever allowing it to assist vision until the examination is almost finished. (b) The maintenance of relaxation by encouraging the patient to see and to recognize something, always with both eyes open and always with some overcorrection over both eyes, during the entire skiascopic and most of the trial case examination. (c) The constant watch for the instant of greatest relaxation whenever that occurs, to form a reasonably accurate estimate of what and how much the refractive error *really* is, as well as what the accommodation makes it *seem* to be; always remembering that the patient is usually more hyperopic (or less myopic) than he appears to be, and that the limit of possible ciliary relaxation may not yet have been quite reached. (d) Confidence that material relaxation will usually be obtained with sufficient effort, at some time during the examination, tho perhaps but for an instant. (e) Appreciation that the numerous methods of repressing the ciliary muscle are less important in themselves than in the thoro way in which they are used. (f) Experience: Accurate refraction under cyclodamia cannot be surely attained, unless and until one who can refract well with a cycloplegic has also learned how much control of the accommodation by optical means only he can himself obtain in average types of patients, and has sufficiently checked this by rerefraction under cycloplegia. The number of cases which can then be satisfactorily refracted by the use of cyclodamia instead of cycloplegia should be considerable, tho it will naturally vary somewhat with the training and experience

of the examiner, with his ability to control the accommodation, and with his alertness to observe the real limit of its variability.

4. The frank use of a cycloplegic in those cases in which relaxation seems unsatisfactory, as for example in spasm of the accommodation, in convergent squint in vigorous children, etc., and in cases where cyclodamia uncovers too little refractive error to explain symptoms of probable accommodative origin. This may sometimes be obviated by reexamining on another day as early in the morning as is practicable, and before the patient has been allowed to do any close work whatever. Some cases, however, will yield only to a cycloplegic, altho these, which seem frequent at first, become much rarer with practice.

GENERAL CONCLUSIONS: We can be much more accurate in refracting without a cycloplegic than most of us are: If we cultivate accuracy in each step of the examination; if we use the prin-

ciples of cyclodamia here outlined, continuously and consistently, and treat the ciliary muscle at all times as a suspect, whose limit of relaxation requires real effort to reach; if we keep a clear mental picture of the probable amount of error as distinct from the apparent amount; if we check our results by inconsistencies in the record; and if we use common sense and judgment as to when and how far to crowd the correction from the apparent towards the probable. Cyclodamia takes more time at first, but with sufficient practice comes to take little more than other methods. When we have sufficient experience to be able to trust cyclodamia, we may avoid the annoyance to both patient and examiner of routine cycloplegia; and by getting more knowledge of his accommodative vagaries, and by fitting glasses under the same conditions as those under which he lives and works, we are more apt to make the average patient comfortable.

836 Myrtle Ave.

DIAGNOSTIC METHODS. PERIMETRY NEGLECTED.

WILBER F. SWETT, M.D.

SAN FRANCISCO, CALIFORNIA.

In European clinics perimetry is extensively used and found an important method for reaching a diagnosis. It is much neglected in this country. Various practical applications for it are indicated. The slit lamp is less widely applicable. Red free light serves to discriminate between optic neuritis and choked disc or atrophy and edema of the retina. Read before San Francisco County Medical Society, Eye, Ear, Nose and Throat Section, February, 1926.

I have been recently asked what impressed me as the most important phases of differential diagnosis in ophthalmology as I saw it abroad. The study of pathology is probably the most noticeable feature of their work and is made possible by the great wealth of material concentrated in the large centralized institutions. The keenness of our differential diagnosis in ophthalmology is dependent on a thoro knowledge of pathology, just as in any other branch of medicine. However, at this time I wish to omit further discussion of pathology and speak of the other methods used in making a differential diagnosis and especially the routine study of the visual fields.

The various appliances useful as adjuncts in the study and diagnosis of diseases of the eye named in the order of their relative importance are, in my judgment, the perimeter, Gullstrand ophthalmoscope, corneal microscope, red free light and slit lamp. Perimetry is, next to a thoro knowledge of ophthalmoscopy, the most valuable and important aid to the proper interpretation of difficult ophthalmoscopic pictures.

The finding of large defects, such as the commoner types of monocular, heteronymous, or homonymous hemianopsias, are not difficult. They are readily discovered, even if a rough field is taken with the fingers, and need no further discussion, other than to say that this should be made a part of rou-

tine eye examinations. It is not this type of visual field defect which is being neglected, but those present in the more common lesions of the disc and fundus, in which we are too ready to base our final diagnosis on the ophthalmoscopic picture alone.

In taking the visual fields several methods are to be employed depending on the type of case. The ordinary self-registering perimeter is the more rapid and satisfactory for the routine examination. It may be replaced by instruments of greater precision, if the rougher and more rapid methods give any indication of a lesion. The Bjerrum or tangent screen and campimeter are indispensable for this purpose.

The value of the visual field in localizing a lesion in the fundus which otherwise would have been overlooked in our routine ophthalmoscopic examination, repays us for the extra work involved. For example, a flat detachment, or a peripheral chorioretinal lesion, where the changes are so slight as to escape detection by less accurate methods.

Those patients in whom the fundus shows changes should have color fields, those for white being of secondary importance as it is in these that the earliest changes may be detected. The procedure is to take the fields in red, blue and white. Blue and yellow field defects are usually found in lesions involving the perceiving apparatus. Defects in the red and green indicate lesions in the conductive apparatus. A field taken in blue and red is usually sufficient and time saving; because green and yellow are too neutral and difficult, to be undertaken by any one not specially skilled in the work.

The blue and red fields provide a differentiation as to the seat of the lesion, many of which are characteristic of certain diseases and completes the picture of what otherwise may be a vague clinical syndrome, and thus assists us in early diagnosis, prognosis and treatment.

In those diseases which result in early central, or paracentral scotoma, the stereocampimeter is excellent, but

not as reliable in the incipient stages as the tangent screen. Of course, the campimeter is the instrument of choice in cases of poor central fixation.

The campimeter is too small, and used at too close a range to detect the finer changes, which can be found with the greater distance with a tangent screen. For this reason the Bjerrum screen is used abroad, almost entirely in the place of the campimeter. The distance used is 120 cm., and the results are easily transferred to any standard visual field chart, as 2 cm. corresponds with 1°. This method is especially reliable in the detection of small color scotoma. Take for example a patient with a more or less flat, pale disc, normal tension, and few or no subjective symptoms in whom you are at a loss as to whether you are dealing with an atrophy, or an incipient glaucoma.

The color defects and concentric narrowing of the fields are more pronounced in atrophy than in glaucoma, while the enlargement of the blind spot and paracentral scotoma are indicative of incipient glaucoma. Likewise, a glaucoma excavation need not be marginal, and may appear as a large physiologic excavation, so that field must be taken to settle the point. In such instances the tangent screen is the method of choice and especially when the fields are taken in red and green.

We frequently see cases of atrophy in which the question arises, is this a primary or secondary? Why waste time studying the disc, take a central field. A central scotoma is never seen in a primary atrophy, but only in inflammatory conditions of the optic nerve, therefore a defect in the red or green in the central region settles the point.

In cases of pseudoneuritis, incipient glaucoma, early choked disc and neuritis we can differentiate as follows:

Pseudoneuritis. Normal form and color fields.

Glaucoma. Enlarged blind spot, paracentral scotoma, nasal sector defect, concentric narrowing.

Choked disc. Peripheral field normal, central normal, enlarged blind spot.

Neuritis. Contracted fields always, central normal or relative for white, central scotoma for red and green.

Choroidal lesions give defects for blue and yellow. Therefore when in doubt as to the presence or absence of central changes in myopia, luetic central choroiditis, or senile changes, take the fields in blue or yellow. In the senile type we find a very slight pigment change with marked functional disability, or even an absolute central scotoma. In the luetic choroiditis the pigment changes may be more marked and stationary, but the scotoma is not as marked and recovery of function is usually complete. Myopia takes a place between these two extremes.

There is little doubt that in glaucoma the visual field is our most reliable aid; not in making the diagnosis, but in deciding the rapidity of progression, the choice of operation and the prognosis. The tension, of course, is important, but the visual field is still our most delicate measure of function.

Most of these points on visual fields are well known by most ophthalmologists, but are not always used to full advantage. Abroad these methods are more appreciated and in a large measure responsible for more accurate diagnosis.

SLIT LAMP. It is necessary to study many eyes with the slit lamp to become highly proficient in the use of the instrument; and its diagnostic value is limited to the unusual, and rarely supplies more reliable data than can be obtained by the old classical methods of focal illumination and the loupe. It is excellent in localizing lesions in the anterior segment, particularly lenticular opacities and various congenital abnormalities of the lens and anterior portions of the vitreous.

RED FREE LIGHT is considered more practical than the slit lamp. The fact that the retina becomes visible by this means makes it practical and extremely useful in lesions involving the disc and retina. Any one practiced in the direct method with reflected light should have no difficulty in its employment. In the differentiation of choked disc, optic neuritis, localization of retinal hemorrhages, retinitis, retinal atrophy and retinal edema, it is the method of choice.

THE LARGE GULLSTRAND OPHTHALMOSCOPE is used to study most fundus lesions principally because of the training received in the use of the ordinary ophthalmoscope and to check upon the findings in more difficult cases. By means of red free light the following short differential diagnostic table may be of interest:

Optic Neuritis. Swollen black capillaries, white masses of exudate on disc, increased yellow reflex.

Choked Disc. Nerve fibers widely separated about disc, white concentric folds about disc. No exudate.

Atrophy of Retina. Absence of nerve fiber layer, absence of macular yellow spot, marble mottling.

Edema of Retina. Loss or decrease in size of yellow reflex, reversed parallax on foveal reflex, nerve fibers separated.

Many fail to take advantage of the opportunity to study pathologic material and thus extend their knowledge of eye diseases as is more commonly done abroad. Greater precision in diagnosis can be attained by taking full advantage of the possibilities offered by the above mentioned diagnostic aids, perimetry especially, and increase the consultation volume of the ophthalmologist.

Stanford University Hospital.

SOCIETY PROCEEDINGS

MEDICAL SOCIETY OF THE DISTRICT OF COLUMBIA.

Section on Ophthalmology and Oto-Laryngology.

April 23, 1926.

DR. W. T. DAVIS, Chairman.

The Toxic Amblyopias.

DR. LEROY W. HYDE reviewed the literature on the effect of tryparsamid on the ocular apparatus. From the observations of the workers he concluded that: Tryparsamid will produce changes; that these are not more frequent than in untreated cases of central nervous system syphilis and that these changes are more likely to occur in cases already showing optic nerve involvement. If changes occur in the fields of vision, the drug should be withheld until normal fields are restored, when it can again be continued. Dr. Hyde presented a case which has shown marked contraction of the fields, later becoming normal when the drug was withdrawn.

Dr. Hyde brought out in his discussion of tobacco-alcohol amblyopia the probability of its increase due to the consumption of home made liquors containing large quantities of the very toxic lesser alcohols. He presented three cases. The first one showed complete papillomacular atrophy and permanent central scotomata. This patient had consumed large quantities of peach brandy over a long period. There was no improvement in the condition after a year's observation.

The second case occurred in a man forty-eight years old who denied the use of alcohol. He smoked about twelve cigars a day. Improvement was rapid when these were withdrawn.

The third case occurred in a man of sixty who had had a syphilitic involvement of the central nervous system for thirty years. He had neither pupillary reflexes nor knee jerks. He had consumed small quantities of liquor for a long period, but just prior to the appearance of symptoms he had increased the daily consumption of corn liquor considerably. The paracentral

scotomata disappeared rapidly when the alcohol and tobacco were withdrawn. Dr. Hyde thought it possible that the syphilitic infection was a contributory cause.

Discussion. DR. J. BEATY GRIFFITH said Dr. Hyde presented some interesting figures on a subject about which the average oculist knows too little of a definite character; that is, the supposed detrimental action of tryparsamid on the visual tracts.

He said the cases he had seen were referred to him after they had received several doses of the drug, and had complained of visual disturbances. All of these cases showed definite pathology, but the question was how much of this was due to the preexisting syphilis and how much to the drug.

Until we have a more definite knowledge of this new arsenical, it would appear logical that the ophthalmologist make a careful survey of the eyes before the administration of the first dose of tryparsamid and thereafter use these findings as a basis for comparison and conclusions.

Infection Following Needling for After Cataract with Recovery of Good Vision.

DR. JOHN W. BURKE presented a patient, Mr. G. A., aged 57, upon whom he had done a combined extraction on the left eye on May 1, 1924. June 13, 1924, vision of left eye was 20/20 with correction. April 3, 1925, patient complained of vision being dim and of being unable to do his work well. Left eye vision equalled 20/40 with correction. A rather thick capsule was found present in the pupillary space so a needling operation was advised. On April 30, 1925, smears from both eyes were negative; general physical condition was good. A needling operation was performed on the left eye. A puncture was made in the cornea near 12 o'clock. When the knife was withdrawn the wound of entrance was touched with actual cautery. Atropin and bichlorid salve were instilled and dressing applied. Patient remained in the hospital for two days and was discharged with his eye fairly quiet. He

was readmitted to the hospital on May 5th, with a marked hypopyon and the eye violently congested. He was given hot compresses, atropin and 3,000 units of diphtheria antitoxin subcutaneously every other day for four days. (Dr. John E. Weeks and Dr. John M. Wheeler were in town and saw the case in its early stages and both felt that it was an infection carried in at the time of operation.) Treatment continued and patient was discharged from the hospital on May 27th. The eye was fairly quiet. On June 6th, the vision was 20/100 + 1 with old correction. His vision gradually improved. The vision is now 20/20-3, with correction.

Discussion. DR. BURKE said that he thought infection of this kind could be avoided in many cases by making the puncture in the conjunctiva near the limbus.

Unusual Injury with Normal Central Vision Retained.

DR. JOHN W. BURKE presented Mr. T., aged 26, who was shot in both eyes with number 9 chilled shot while hunting on December 10th, 1925. He had been treated in Augusta, Ga., until February 26th when Dr. Burke first examined him. The right eye was phthisical with no perception of light and a complete detachment of the retina. The left eye showed a small scar just below the limbus at five o'clock. The left pupil was normal in appearance and reacted normally. Tension was normal to fingers. The vision in the left eye was 20/30; with + 1.00 cyl. ax. 105° vision equaled 20/20+. Jaeger No. 1 was read at 8 inches with the left eye with correction. Ophthalmoscopic examination showed lens clear. There were no changes in the vitreous. Below and to the temporal side there was a large area, extending toward the macular region, in which the sclera could be plainly seen. The margins of this area showed some ragged pigmentation. There was no evidence of any inflammatory reaction and the neighboring retina and choroid were normal in appearance. The remainder of the fundus

was normal. A roentgen ray examination showed no shot in either eye. However, there was a shot lying behind the left eye and apparently in close proximity to the optic nerve. His form field showed a sector cut out corresponding to the scar described above.

Dr. Burke said that he felt that it was a rare incident to find a thru and thru wound of the eye by a shot with a normally functioning eye retained.

JAMES N. GREEAR, JR., M.D.,
Secretary.

KANSAS CITY EYE, EAR, NOSE AND THROAT SOCIETY.

September 2, 1926.

DR. J. W. KIMBERLIN, Presiding.

Intraocular Tumor.

DR. JOSEPH S. LICHTENBERG presented a male patient aged 80, who was first seen July 31, 1926, complaining of failing vision in both eyes. This began about three months ago. He had no other symptoms relative to his eyes. His past history was essentially negative except that he had a sore in his right temporal region that had persisted for some time, for which he was getting roentgen ray treatments.

Examination: V. O.D. 20/120 and with + 0.25 + 1.00 ax. 180° V. = 20/30; V. O.S. 10/200 and with + 0.25 + 1.00 ax. 180° V. = 20/120.

The patient had a skin cancer in the right temporal region. Pupil of the right eye was normal in size and reacted fairly well to light and accommodation. The eye appeared normal except for slight arteriosclerotic changes in the fundus. Tension was normal. Left eye: The episcleral vessels, nasal and slightly below the limbus, were distended. The cornea, anterior chamber and pupil were normal. Pupil reacted to light and accommodation as well as that of the fellow eye. Media were clear. Nasally and below there was a grey mass which showed two folds otherwise appearing to be adherent to a mass that had two lobes, one nasal and one below. The vessels of the retina were seen distinctly over the mass, with a + 16.00 sphere. The mass

extended to the pupillary margin nasally and could be seen by oblique illumination. The optic disc was seen distinctly and the fundus elsewhere was also seen well. It showed slight arteriosclerotic changes. Transillumination of the globe showed a shadow down and in. Elsewhere it was clear. The tension was normal. Wassermann was negative. Roentgen ray of orbit was negative. Field of right eye was concentrically contracted; of the left eye limited to the lower half.

Intraocular tumors usually are melanotic sarcomas. The fact that this man had a skin cancer on the side of his head and that it was slow growing suggests that this might be a carcinoma.

In removing an eye with a new growth, the optic nerve should be cut as far back as possible, and a frozen section examined microscopically. If the eye is enucleated early the prognosis is good.

Roentgen ray and radium are said to arrest the progress but have not been tried here. Enucleation as soon as possible was advised.

Discussion. DR. A. W. McALISTER called attention to the infrequency of intraocular carcinoma stating he had seen only one case. He advised immediate enucleation.

DR. JAMES W. MAY said he had seen only three cases in his practice and these after perforation of the globe. In the only operable case the orbit was exenterated and cauterized with soldering iron. Three months later the patient returned with a growth that extended from the ala of the nose to his ear and the hair line on the forehead.

DR. R. J. CURDY remarked that if the optic nerve was found to be involved the patient should be given roentgen ray or radium treatments after enucleation.

DR. J. W. KIMBERLIN pointed out that we should remember that these cases often do not come to us till long after the beginning of the trouble and that distant metastases may have occurred before they come to us for examination.

ALBERT N. LEMOINE,
Reporter.

THE MEMPHIS SOCIETY OF OPHTHALMOLOGY AND OTOLARYNGOLOGY.

August 10, 1926.

DR. M. B. SELIGSTEIN, Presiding.

Pulsating Exophthalmos.

DR. P. M. LEWIS presented J. R., colored, male, aged 24, who was first seen on July 23, 1926, in the eye clinic of the University of Tennessee. Six years ago while working on the railroad he received a violent blow over the forehead and in the left eye. The left eye was removed shortly afterward. The right eye became unduly prominent after the injury, but it never gave him any trouble until he received another injury five days ago. He was struck just above the right eye with a heavy stick or bat by robbers. Almost immediately afterward the right eye "popped out of its socket," so that he now cannot shut it tightly. Two days ago the eyeball became sore. He did not notice any noise in his head.

The right eye was markedly proptosed and the conjunctiva so edematosus that it hung completely over the lower lid and rested on the cheek having an appearance similar to a large protruding hemorrhoid. The conjunctival veins were greatly engorged and the veins of the forehead on the right side were enormously dilated and very prominent. The lower portion of the cornea was ulcerated, and a gray infiltration had spread upwards over the pupillary area so that vision was reduced to 20/100. The tension was normal to palpation. The pupil was small but dilated easily with atropin. The fundus appeared to be normal, except for considerable congestion of the veins. A very definite bruit could be heard over the frontal region by naked ear, and with a stethoscope the aneurysmal hum could be heard over the eye and entire skull. No thrill or vibration was detected by palpation. The eye was immobile.

The patient was admitted to the Memphis General Hospital and treatment given to control the corneal ulceration. The following day the patient agreed to have a ligation of the

carotid artery. On July 25th the right internal carotid was ligated under local anesthesia by the attending general surgeon, Dr. J. J. McCaughan. The patient suffered no particular disturbance following the ligation, and improved immensely. The conjunctiva was still prolapsed over the lower lid but less marked. The keratitis, bruit and dilated veins of the forehead disappeared.

The most frequent cause of pulsating exophthalmos is an aneurysm of the internal carotid artery into the cavernous sinus. The condition is rather rare, a little over 300 cases in all having been recorded.

Tumor of the Orbit.

DR. P. M. LEWIS presented M. G., colored, female, aged 48, who was referred to him for operation at the City Hospital on August 4, 1926, by Dr. H. F. Minor.

She first noticed that her left eye was more prominent than the right four years ago. Proptosis had gradually increased ever since. Sight began to grow dim over two years ago and had decreased to practical blindness. Movement of the eye downward caused pain. Patient had been taking mixed treatment for the past six months without causing any change in the eye. Pain and aching in the back of the head had been constant for the past several weeks.

The right eye was normal. Vision was 20/20. There was a marked exophthalmos of the left eye. The displacement was mostly straight outward and slightly downward. The pupil was normal in size and shape and reacted to light consensually and

directly when the light was thrown in from below. The tension was normal to palpation. A large hard mass was felt in the upper part of the orbit behind the globe. The mass was not at all movable, apparently being attached to the orbital roof or floor of the frontal sinus. The motion of the eye was limited somewhat in all directions, especially up and outward. Transillumination of the globe was negative. The media were clear and the fundus showed a white, atrophied nervehead, which was slightly elevated. The arteries were quite small. Vision: Counted fingers at one foot in lower nasal quadrant of field. No light perception in upper fields, and faulty projection temporally. Fields and blind spot of right eye normal.

General physical examination was negative. Roentgen ray pictures were made of the orbit and the nasal sinuses by Dr. Pulliam at the Memphis General Hospital. Report: "Left orbit was filled with a dense mass which appeared to be bone. The roof of the orbit and body of the sphenoid bone seemed to be replaced by the growth." (Plates shown.)

The tumor apparently was a large osteoma of the orbit. The roentgen ray plates indicated that the growth extended posteriorly past the orbital apex to the body of the sphenoid bone. Exploratory operation and removal of the tumor if possible will be performed on August 12, and the result will be presented before the society at the next meeting.

P. M. LEWIS,
Secretary.

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SYMPATHETIC INFLAMMATION OF THE EYE.

For almost a hundred years sympathetic ophthalmia has held a rather large place in ophthalmic literature; but at no time has there been greater uncertainty as to its essential nature, real cause and true pathogenesis. Much that has been written about it of late years has added to the confusion, instead of clearing up our ideas regarding it.

In the beginning it was given recognition as a clinical entity, with these characteristics: After injury and chronic plastic inflammation of one eye, the inflammation arose in the other. Early removal of the injured eye prevented it. It presented the clinical features of a chronic, relapsing iritis, or uveitis, always in the end fatal to sight. The characteristic changes were found in the uveal tract, altho other parts of the eye became involved. From a very early period, other pathologic conditions were confused with typical sympathetic inflammation.

There were cases in which, even many years after the injury and after the symptoms and disability of the other eye had become complete, removal of the injured eye was followed in a few days, or even in a few hours,

by complete restoration to normal, of the eye sympathetically affected. These cases were separated from true sympathetic ophthalmia, and given the name of sympathetic irritation, as a group radically different in character, while the true cases of sympathetic inflammation were called sympathetic ophthalmitis.

Other cases were observed of what closely resembled sympathetic inflammation of an eye; in which the fellow eye never had suffered injury, but was the seat of a malignant tumor, generally sarcoma of the choroid, or retinoblastoma. With what we now know of malignant disease and its extension by metastases, we should carefully inquire whether such cases ought to be classed as sympathetic. Possibly there may be instances in which an influence on other parts of the body preparing for invasion by malignant disease affects the eye; altho no metastatic tumor is developed there, the process being cut short by removal of the primary tumor. Such cases are rare, as compared with the number of cases of malignant tumor of the eye, or as compared with the cases of sympathetic ophthalmia.

Then there have been reports of cases in which, without any history or evidence of injury to either eye, and

without syphilis, tuberculosis, or other recognized cause, one eye has become affected with uveal inflammation, which showed a malignant tendency and ran a chronic relapsing course to blindness; and later the second eye became similarly affected. The suggestion has been made that these might be considered "spontaneous" cases of sympathetic inflammation. In still other cases after the injury of one eye, its fellow became affected, not in the usual way with uveal inflammation, but with a conjunctivitis, or keratitis, or an optic neuritis, and such inflammation has been called sympathetic.

It seems clear that cases differing essentially from each other in pathology have been classed together as sympathetic ophthalmia; and the experimental investigations, intended to ascertain the pathogenesis of these possibly allied cases, have added to the confusion. Deutschmann inoculated a rabbit's eye with pyogenic cocci. Optic neuritis appeared in the other eye, and he traced the cocci from one optic nerve to the other by the chiasm. Experiments by H. Gifford and others did not confirm Deutschmann's observations. Students of the subject who reviewed the evidence concluded, that if pathogenic bacteria developed in the injured eye, and then reached the second eye and set up sympathetic inflammation, it was probably by the blood stream, rather than by the optic nerves, or the lymph spaces adjoining.

Brown Pusey called attention to the possible role of cytotoxins. When one kidney of a dog is deprived of blood by ligation, but left in position, it degenerates, and the fellow kidney later also shows degeneration. Nothing of this kind occurs if the ligated kidney is promptly excised. In a similar way cytotoxins, developed in the uveal tract of an injured eye, and carried by the blood stream to its fellow, might produce pathologic changes in the uveal tract of the second eye, and so provoke sympathetic inflammation. Elschnig traced the analogies between this form of disease and various effects of anaphylaxis, promulgating the "ana-

phylactic theory of sympathetic ophthalmia."

Most recently, von Szily, experimenting on rabbits with the virus of herpes, transmitted herpes to one eye of a rabbit by inoculation with herpetic material, and later found the fellow eye also affected with herpes. S. R. Gifford and L. H. Lucic report similar experiments in a paper entitled "Sympathetic Uveitis Caused by the Virus of Herpes Simplex." The title might cause a misapprehension, that the problems of human sympathetic ophthalmia had been solved. Gifford and Lucic, following the technic of von Szily, made inoculations of herpes material in a ciliary pouch in the right eyes of 76 rabbits. "All the inoculated eyes showed a definite reaction, with congestion, photophobia, deposits on the lens and vitreous opacities. This lasted from three weeks to two months." Of these rabbits, 6 developed uveitis and 4 developed corneal herpes of the left eye.

About 15 per cent of these animals developed "signs considered characteristic of encephalitis," and several died. Among rabbits inoculated, not in a ciliary pouch, but in the cornea, 33 per cent had signs of encephalitis, and of these two-thirds died. From eyes inoculated, materials transferred to the eyes of other rabbits produced similar ocular lesions and cerebral symptoms. In 20 rabbits the herpes virus was injected into the region of the chiasm, and one of these developed severe iridocyclitis in both eyes.

Gifford and Lucic confirm the findings of von Szily "that the virus of herpes simplex, when inoculated in a ciliary pouch, will produce in a certain percentage of rabbits a uveitis of the second eye, resembling, clinically and histologically, the picture of human sympathetic ophthalmia; and the active virus could be demonstrated in the second eye by positive corneal inoculations." "Sections indicated the extension of the process by way of the nerves and chiasm to the other eye, and this was confirmed by positive inoculations from points along this route."

The above results were obtained with the virus of herpes. Materials from a case of sympathetic ophthalmia in man were inoculated in the eyes of ten rabbits, "all with negative results." This agrees with the results of similar inoculation of ten rabbits by Marchesani. Of 60 rabbits inoculated by Volmer, 3 showed iridocyclitis of the fellow eye. But of these rabbits two were tuberculous, and the other presented "the picture of herpetic uveitis, but not of sympathetic ophthalmia."

The work of investigators up to this time has failed to reveal any form of bacteria, that could be regarded as the cause of sympathetic ophthalmia. It is possible that it may be caused by an ultramicroscopic organism—a filtrable virus. It is possible that anaphylaxis may be an essential factor in producing it, particularly that occasioned by uveal pigment. It is possibly caused by known bacteria setting up foci of infection in other parts of the body. New evidence must be forthcoming before any of these hypotheses can be regarded as established. Meanwhile care should be observed not to confuse with sympathetic inflammation cases that do not exhibit the characteristic features of its symptoms and course; and as pointed out (p. 631) "the value of prompt energetic treatment should not be obscured by any tendency to pessimism."

E. J.

INTERNATIONAL COMMITTEE OF OPHTHALMOLOGISTS.

In the *Lancet* for October 23, 1926, we find among the "Annotations" the heading "Towards an International Congress of Ophthalmology." Under this it is stated, that the Committee appointed by action of the Convention of English speaking Ophthalmological Societies held in London in July, 1925, considers the time has come to form an international committee. "It is desired that each nation should be represented by two delegates nominated by arrangement between the principal ophthalmologic societies of the nation, or, in the case where no national

ophthalmologic society exists, by representative ophthalmologists, and invitations to nominate delegates have been sent out. The proposal is that the international committee shall meet at The Hague in July next year."

The former International Congresses of Ophthalmology began in 1857, when the first was held at Brussels. The holding of the 14th in Petrograd was planned for August, 1914. But the outbreak of war made it impossible. The revolutionary changes in Russia, later disorganized the committee authorized to plan such a congress, and the results of the war render necessary a new plan for the organization of such gatherings. The Washington Congress in 1922 was a first attempt to once more bring about cooperation in this direction. From it another attempt was made in London and produced the London Convention; and now it has gone forward to the invitation referred to.

It is hoped the representative committee, so proposed, will be more permanent and have a wider following than was usual under the former plan of a new committee, in a new city, formed after one congress to arrange for the next. It has before it important tasks, which include: 1. Securing the participation and support of organizations and individuals in each of the nations. 2. Perfecting its own organization, and working out an acceptable plan for an international congress. 3. Choosing the best place and time for such a congress.

It will take at least two or three years to prepare for such a congress. But other good things are expected to come from the organization of such an international committee. Some of these are indicated in this sentence, in the note above referred to: "The primary function of the Committee when formed will be to arrange for the next international congress. In the meantime it is proposed to obtain such cooperation as is possible in promoting international action in relation to the prevention of contagious ophthalmia, the establishment of uniform methods of recording tests, and the interchange of ophthalmologic literature."

This is real work to be done. We hope that the ophthalmologists of each nation will appreciate this, and send men of good judgment, who can work with others, and who are ready to put forth their best efforts for this movement in wider cooperation.

E. J.

THE COLOR PLATE.

The color plate, which should have appeared in the November number, is included this month, because it was not ready in time for the November issue. The printing of a color plate is a matter of uncertain success, until it is complete. To have the colors accurately reproduced is the reason for having such plates; and where three or four colors have to be superimposed, the result is always in doubt, until the last color has been printed. To get a proof requires at least a day, for the printing and drying of each color, hence the delay in getting Plate 15 just right. In binding the volume, this plate should be placed facing page 801, since it belongs with the article by Dr. Motto on Siderosis.

E. J.

BOOK NOTICES.

Cavernous Sinus Thrombophlebitis and Allied Septic and Traumatic Lesions of the Basal Venous Sinuses. A Clinical Study of Blood Stream Infection. By Wells P. Eagleton, M.D., Medical Director, Newark Eye and Ear Infirmary, Newark, N. J. Cloth, 8vo. pp. 220, 13 ill. 6 charts. New York, Macmillan Company, 1926.

The title of this book indicates the development of our knowledge of this subject and the shifting of the point of view regarding these cases, that has occurred in a single generation. Cases that can be recognized as belonging to this class, are found in the literature of more than one hundred years ago; but under a wide variety of names. Many of the earlier ones were reported in ophthalmic literature, and these were most frequently named thrombosis of the cavernous sinus.

Since operations on the middle ear, mastoid and nasal sinuses have been resorted to, the literature regarding such operations contains numerous cases of this nature; and, from the first, there have been cases noted that began with general infection from other sources.

Few, who have reported such cases, would have denied the possible existence of changes in the sinus walls, associated with thrombosis; but these changes were not emphasized. Only now it is brought out, that the etiology of the bilateral orbital swelling and exophthalmos was generally an infective phlebitis, to be associated with earlier recognized cases of septicemia and pyemia. This essential character of the condition is emphasized in the title of the book, and in the wide variety of the clinical features of the cases reported in it.

The cases included are illustrative cases grouped to emphasize certain things. The points they bring out are indicated by the chapter headings. These are: I. Acute and Chronic Types—Route of Infection. II. Acute Ophthalmic or Anterior Infection. III. Anterior Chronic (Compensatory) Cases. IV. Aural or Posterior Cases, With or Without Proptosis. V. Sphenoidal Cases. VI. Tonsillar and Neck Cases. VII. Noninfective Type of Cavernous Sinus Thrombosis. VIII. Diagnosis. IX. Differential Diagnosis Between Sinus Thrombosis, Meningitis and Brain Abscess. X. Prognosis. XI. Embryology. XII. Surgical Anatomy and Pathology. XIII. Operative Treatment. XIV. Treatment of Thrombophlebitis by Serotherapy and Vaccinotherapy.

These are preceded by an introduction, and followed by a general bibliography, index of authors and index of subjects. The literature of the subject has been widely searched and references to it are found in cases cited, in footnotes and in bibliographies included in several chapters. But only a part of these are referred to in the general bibliography; only the index of authors makes them all available;

and, when hunted out, some of the references are found incomplete.

The class of these cases, of greatest ophthalmic interest, are those of "acute ophthalmic or anterior affection;" in which sudden obliteration of the cavernous sinus leaves no opportunity for compensatory venous channels to be established; and orbital swelling, exophthalmos, diplopia, blindness and ophthalmoscopic changes ensue. But all cases of basal sinus infection are of interest to the ophthalmologist and should be under his observation, for the daily discovery of evidence that may establish the diagnosis and guide operative interference, at a stage when it may be successful. Even to know that ocular symptoms of localizing significance are absent, may be of great importance.

For one whose work is strictly confined to ophthalmic practice, this book contains much that may seem outside his field. But it is related to his work in a way that should awaken interest; and the therapeutic resources that are being applied in other branches of head surgery will sometimes be of great value in ophthalmic practice. Only a very narrow, nonprogressive specialism can ignore such borderland information.

E. J.

Tables with Proximal Colors for Testing Relative Red and Green Visual Acuity. By Ernest Wölfflin, Professor at the University at Basel. 8 pages, 8 tables. Published by George Thieme, Leipzig, 1926.

This book offers a method of testing for small losses of red or green visual acuity. There are four tables, each containing four groups of squares of varying sizes. Some of these squares are so tinted that by daylight, and to persons of normal color vision, they seem to have the same color as the rest; but by artificial light slight color differences can be discerned, which people with hyperacute color sense can recognize by daylight. Similar results are obtained by the use of tables 5 to 8, two tests to the table, which are Stilling's tables adapted to the author's purpose. Patients with small macular lesions can be tested with these tables,

for decrease of red or green color sense. The author describes the technic of using the tables and adds a key to the tables. This book should prove very valuable for the purpose for which it is intended.

C. L.

Stilling's Pseudoisochromatic Tables for Testing the Color Sense. By Geh. Prof. E. Hertel. 17th Ed. Bound. Published by George Thieme. 1926.

These well known tables come in fourteen groups, each table containing two tests, group I consists of two tables; group II, 4; group III, 2; group IV, 2; group V, 4; group VI, 3; group VII, 2; group VIII, 2; group IX, 2; group X, 2; group XI, 2; group XII, 1; group XIII, 2; group XIV, 2; in all 32 tests. Groups XI and XII are new, and changes have been made in the arrangement of the dots in groups VI and VIII.

Groups I to IX are to be used in testing red-green blindness. Groups VII, VIII and IX may also be used in testing blue-yellow blindness. The latter, as well as the violet sense, may be tested by groups X and XI. In group XII the figures cannot be distinguished by persons with normal color sense, and are for use to discover individuals with hyperacute color sense. Groups XIII and XIV should be distinguished by patients with even a great loss of color sense, and should be used to explain the test and to expose simulation.

C. L.

The Ophthalmic Year Book, Volume 22. Edited by William H. Crisp, assisted by 38 collaborators. Cloth 8vo. 325 pages, illustrated. Chicago: Ophthalmic Publishing Company, 1926.

This volume contains bibliographies, digests and indexes, of the literature of ophthalmology for the year 1925. It is a virtue in a year book, that the successive volumes are arranged in the same plan and cover similar collections of papers. But this virtue of uniformity leaves few points of interest on which the reviewer can make a display of originality of observation and expression.

For those who use the year book, such unity of plan is an open door, thru which the reader can take up each new volume with confidence in his ability to find in it what there is of importance and new, on the special subject of his interest. The digest, which concentrates the valuable parts of one hundred times as many pages as it occupies, cannot present the complete contents of any paper it notices. But it generally indicates the fact that a particular paper contains, or frequently does not contain, anything that makes it worth while to seek a fuller acquaintance with it.

The plan, introduced last year, of giving each chapter a number, instead of the page number in the index of authors, is annoying if one forgets what these numbers stand for. But as the chapter bibliography comes at the head of each chapter, and is always brief, and the names arranged alphabetically, it is almost as exact a guide as the page number could be. The fact that the numbers of chapters are shorter and fewer, makes it easier to use the index, and compensates for any effort in learning their true significance.

The Editor in his introduction refers to the saving of space, by the omission of references that possess little or no permanent value. To keep what is of no help out of the way of the reader, and so to reduce the number of pages he must go over to find what really supports or illustrates his view, or throws light on his case, is the great service of a year book. This becomes more clear as the number of volumes increases and the literature they summarize and make accessible, grows in bulk; as it must every year, for all who would keep abreast of the development of ophthalmology.

E. J.

Societa Italiana di Oftalmologia, Atti del Congresso d'Oftalmologia 1925. Paper, small quarto, pp. 384, 17 plates, 4 colored, 23 illustrations. Rome, Tipografia delle Scienze, 1926.

Among the annual transactions of medical societies this volume has a

distinguished appearance, with its broad pages, large type, distinct impress and fine plates. Of the plates, four showing pathologic conditions of the fundus and anterior segment of the eye are in colors, 6 are of micro-photographs of tissue sections, and others are reproductions of photographs of distinguished workers in ophthalmology and of sessions of the Congress. Most of the illustrations are of high excellence, the only exception being reproductions of pictures of historic interest, taken in the early days of photography.

The 104 communications published in this volume have a wide range of subjects; but all are related to ophthalmology. Most of them are brief and some, especially reports of clinical cases, are very brief. Two of the longest papers were by Dejean of Montpellier, France, reporting a study, anatomic and embryologic, on the hyaloid membrane, which was awarded the International Prize; and one by Cattaneo of Rome, on tuberculosis of the choroid, awarded the National Prize. A shorter paper on the anatomic basis of perimetry of the blind spot, by Scullica of Sassari, was given the prize for Anatomy of the Eye. There are some other papers going into anatomy to some extent, and ten others devoted chiefly to questions of pathology. These transactions show evidence of laboratory work on subjects fundamental to ophthalmology, more than do most other proceedings of national ophthalmologic societies.

Of papers chiefly of practical and clinical interest, 9 refer to cataract and the crystalline lens, and 7 to lacrimal disease, while 5 refer to glaucoma and 5 to trachoma. Others report trials of local serotherapy and autohemotherapy. But there are others not to be placed in any of the common divisions of the literature. Thus Scimemi describes a graphic method of determining the position of a certain point in the fundus of the eye, as a small cysticercus, which he illustrates by a diagram and a table of apparent and real positions. More removed from ordinary clinical work is a paper by Lo Cascio,

on the total intracapsular accommodation of the crystalline lens. Among novelties presented to the Congress may be noted a new type of skiascope shown by Balacco. Two discs, each carrying ten lenses, and capable of rotation so that any lens can be brought before either eye, are supported by a headband on the patient's head. The patient can rotate any lens before his eye, according to the instruction of the observer making the test. Contino presents an optotype, of variable size, for testing visual acuity. This is mounted on a firm stand and the size of the type, a capital V, is exactly controlled by a mechanical adjustment.

Good work is being done in Italy, in the direction of ophthalmic science, and some of the best is being published thru this annual national congress and its transactions.

E. J.

Ocular Affections of Dental Origin.

Rogerio Marcus da Silva, M.D.
Paper, 8vo., 126 pages. Published
(in Portuguese) by the Faculty of
Medicine and Surgery of San
Paulo, Brazil.

This work was submitted and defended by its author, as a thesis for the medical degree which he was awarded in January, 1926. It gives an historical sketch, tracing the development of the subject from Hunter 1771, thru Beers and Travers in the early 19th century, to the numerous papers relating to it, that have appeared in the last 20 years.

The manner in which affections are transmitted, from foci more or less distant, to the eyeball and orbit receives considerable attention, taking up one by one the various ocular lesions that arise in this way. A better understanding of the pathogenesis of these affections of dental origin, is essential to more exact and effective treatment.

The argument of the author is supported by illustrative cases; including, hemorrhagic chorioneuroretinitis, exudative chorioretinitis, eczematous keratoconjunctivitis, hypopion ulcer of the cornea, uveitis, retrobulbar neuritis and reflex disturbances. The latter are not illustrated by new cases, but most conditions that are represented in the literature are mentioned.

This monograph brings together in rational relations many parts of anatomy and pathology, to elucidate these conditions; and express conservative balanced judgment, regarding these affections.

E. J.

La Jonoforesi Nella Cura Medica Della Cataratta. Prof. A. Angelucci.
Paper, 8 vo., 80 pages. Naples,
Tipografia Editrice Tocco, 1926.

This is a paper presented to the Royal Academy of Medicine of Naples. It may be said to consist of four parts: First a survey of the various suggestions that go back almost as far as the history of medicine, that cataract might be amenable to medical treatment, local or general. Second, references to various suggestions of the use of electricity and iodides for cataract. Third, attempts to use iontophoresis by various writers, and the apparatus they employed, including his own work in this direction. Fourth, he gives an outline report of 51 cases subjected to this treatment and the results obtained as indicated by the visual acuity.

The time that these cases were under observation varied, from a few days to several months. They generally show improvement in vision at the end of treatment; as from 1/20 to 1/8, or from 2/3 to 10/10. But the complete absence of data as to the refractive conditions in these eyes, or the size of pupils at the various tests, leaves the evidence they afford indefinite and inconclusive. The monograph raises a presumption, that the treatment of cataract by iontophoresis may have some value and is worthy of additional trial and observation.

E. J.

Aviation Medicine: By Louis Hope-well Baier. A.B., M.D. Major, Medical Corps, United States Army, Commandant The School of Aviation Medicine. Published by authority of the Surgeon General, Baltimore. The Williams and Wilkins Company.

The literature of Aviation Medicine has not heretofore been collated into a volume and is scattered thru many hundred publications. As the development of aviation progresses the medical profession must keep pace. Flying

is yet in its infancy and likewise aviation medicine is only beginning. Man has become adapted over eons of existence to terrestrial environment, but now he flies, traveling at terrific speeds, compensating for the diminished oxygen and intense cold of high altitudes, glare and disturbances of his equilibrium, subject to fatiguing conditions of his physique, his mind and his nerves.

In the first year of the World War, out of every one hundred aviators killed two met death at the hands of the Germans, eight because of defective planes and ninety were killed due to their own individual deficiencies. Of these ninety, sixty deaths were found to have been due directly to physical defects. Every country now requires a special physical standard as a result of which we are now able to state which men should fly and which men should not; and, capable pilot tho the man may be, in other respects fully capable of managing any machine, profession or business, it has been found from practical tests and the result of experience, that but few men are able to properly pilot an airplane.

We medical men are responsible for the selection of the flyer, and as this is a specialty which particularly involves a knowledge of physiology and medicine, of ophthalmology and otology, of psychology, neurology and psychiatry, it is necessary that the doctor in charge fully inform himself on these subjects and their relation to flying. Flight surgeons are now known as such in the army. He selects those fit to fly, classifies them as to their ability to withstand the effects of altitude, and, finally, he maintains medical supervision over them, in order to keep them in a condition fit to fly. As a result, many lives are saved and accidents are becoming less frequent.

This book takes up the question of the selection of the flyer, the general physical qualifications, the eye in aviation, the nose, throat and ear and equilibrium, neuropsychic factors, reaction time, in Section One. In Section Two the Physiology of Aviation, including the classification of the flyer. In Section Three: The care and main-

tenance of the flyer. The last chapter takes up civilian flying, including the medical requirements of the International Congress for Air Navigation. A quite complete bibliography and a full supplement of forms, follow with an exhaustive index.

The work is recommended to all medical men, especially to those becoming interested in Aviation Medicine, and more especially to all Reserve Army Surgeons, who are now commencing to take the U. S. War Department Correspondence Course on Aviation Medicine.

The Publishers are to be complimented upon the character of their printing and paper. Their motto "Sans Tache" is indeed well chosen.

H. V. W.

CORRESPONDENCE.

The Prism Test for Malingering.
To the Editor:

I note in the October number of the Journal an account of a prism test for malingering which purports to be new; but of which a very precise account is given with methods of using it by Baudry, in his paper on malingering in the Norris and Oliver System of Ophthalmology. This article has probably been overlooked by the author of the paper.

F. W. Marlow.

Syracuse, N. Y.

[The instrument described by Dr. Schild (p. 741) and the method of using it are somewhat simpler than those of Baudry; altho the prism itself is essentially the same, and the principles involved were well explained by the latter.—Editor.]

BIOGRAPHIC NOTICE.

ALEXANDER DUANE.*

CONRAD BERENS, M.D.

NEW YORK.

As in a garden we some times find a delicate flower which seems to be particularly favored by nature and grows above others, sustained by firm roots and a strong stem, so Doctor Duane, the great

*Read before the American Academy of Ophthalmology and Otolaryngology, Colorado Springs, Sept. 14, 1926.

physician, reared by refined, cultured, loving parents who gave to a sensitive nature a firm foundation which was further developed by a loving wife, has done much thru his noble and ethical work to advance the science of ophthalmology. Altho sensitive, modest and retiring by nature and of delicate constitution, his love of truth and firm character made his personality felt as a strong force in professional and civic life. On June 10, 1926 this rarest of souls and master of all branches of ophthalmology was called to join the immortal dead who will ever live in the hearts of those made nobler by their presence.

Alexander Duane was borne in Malone, New York, September 1, 1858. His father was Major General James Chatham Duane, a graduate of West Point, who when he retired from the Army was Chief of Engineers. During the Civil War he acted as Chief of Staff for General McClellan. General Jeb Stuart said when he heard of his capture that he would rather have Duane than a whole regiment of cavalry. His great great grandfather was an officer in the British Navy and his great great grandfather was a judge and the first Mayor of New York City. One who had ever seen Doctor Duane would always remember his refined, sensitive expression and his distinguished fore-bearers probably gave to him many of the qualities which made him a strong force for the best things in life, as well as the refinement and lovable characteristics which attracted and held so many warm friends.

His mother, Harriett Brewerton, was the daughter of General Henry Brewerton, a noted army engineer, who was at one time superintendent at West Point. He married Susan W. Galt July 14, 1891.

A good deal of his early training was given him by his parents and as his father was stationed in Portland, Maine, he attended both public and private schools in Portland, for which he had a high regard. He went from there to St. Marks, and even in his early school life he showed his scholarly nature, for he was always either at the head of his class or very near it. He also showed at an early age his ability to write, and con-

tributed to his school and later to his college papers, and to current periodicals.

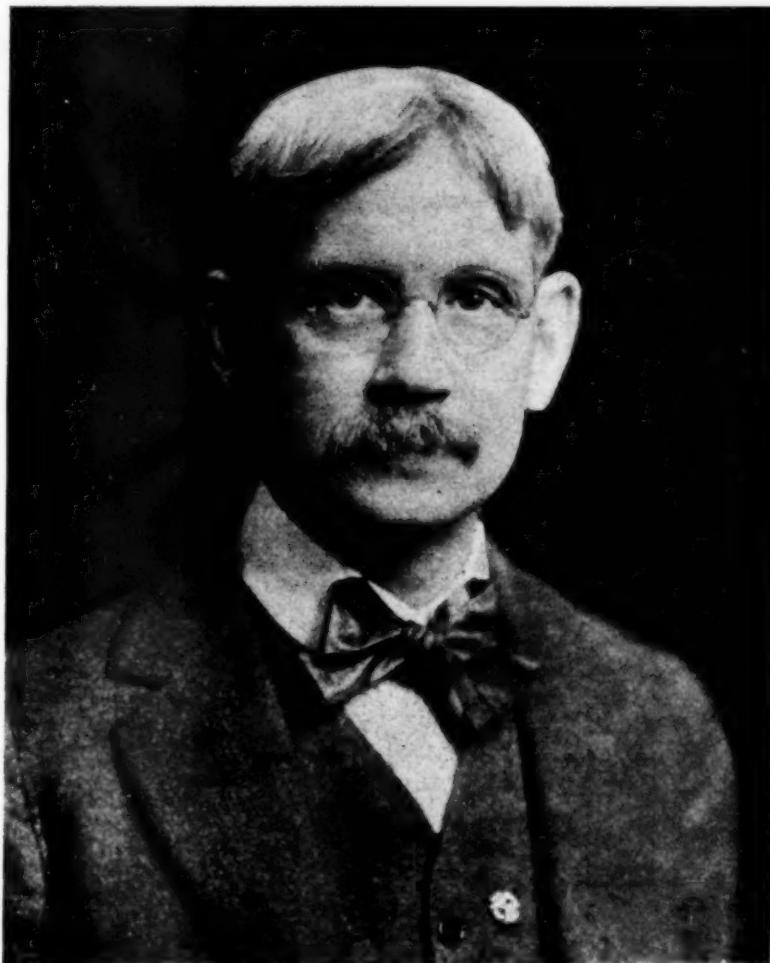
He was graduated from Union College receiving the degree of A. B. in 1878, at the age of nineteen years, and in 1919 he received the degree of Doctor of Science. He was the president of his class, the head of his class and a Phi Beta Kappa man. He was bright, witty, and quick and in spite of his scholarly attainments his classmates always wanted him no matter how lively the party was. This was all the more noticeable because of the fact that he never smoked or drank. He kept in touch with his classmates during his life and to show their deep esteem for him they gave him a gold loving cup at the class reunion of 1914. He believed in the old motto *Mens Sana in Corpore Sano*, and showed his ability and love for outdoor sports, by having been chosen a member of the baseball team of his college.

His medical education was received in the College of Physicians and Surgeons, New York, from which he graduated in 1881. Shortly after graduation he received an appointment as resident physician to the New York Hospital, and completed the medical and surgical service in this institution. It was here that he became associated with Doctor William Thompson, and this marked the beginning of a life long friendship. He always spoke with deep affection of Doctor Markoe and credited him with having been a strong influence in properly shaping his early medical career. His early ambition was to be a general practitioner for which he was eminently fitted by his excellent training and sympathetic nature, and he did practice general medicine in New York City from 1884 to 1887, when he came under the influence of Doctor Herman Knapp and Doctor George T. Stevens.

He was associated with Doctor Stevens in office practice for six months and it was his influence and teaching that gave Doctor Duane his early understanding of, and interest in, ocular muscles. His earliest clinical training was under Doctor Herman Knapp, for whom he had the greatest admiration, and who was then directing his hospital on Twelfth Street. In

1889 Doctor Palmer of Norfolk, Virginia, offered him a partnership in his office, where he remained a year and returned to New York. In 1894 Doctor Herman Knapp asked him to act as assistant in his office and in his clinic. Here he was in close associa-

known for the courses he gave on ocular muscles and physiologic optics. His first medical publications dealt with the ocular muscles; and the first one was published in the New York State Medical Journal in 1889 and dealt with "Some New Tests for Insuffi-



ALEXANDER DUANE
1858-1926

tion with Dr. Ward Holden and later with Doctor Arnold Knapp.

He was always interested in teaching and taught for a short time at Cornell University. Even tho he gave up active teaching in a medical school he gave many courses covering various branches of ophthalmology, during his life, to men practicing ophthalmology, who wished special instruction in certain branches. He was best

ciency of the Ocular Muscles." He read a paper on "The Modern Treatment of Strabismus" before the Medical Society of Virginia in 1890. These publications were well received, as they showed the results of earnest study and were based on practical experience.

In later medical life he was surgeon in the Knapp Memorial Hospital; but he could not do a great deal of clinic

work, due to the fact that he was constantly making valuable contributions to the literature of ophthalmology. However he was extremely charitable and treated many free patients.

He was a respected member of many societies, and his papers and discussions were always received with keen interest, for he never presented anything trivial. He was a beloved member of the American Academy of Ophthalmology and Oto-Laryngology for many years, and in this work he was always deeply interested. He was also active in the American Ophthalmological Society, and was honored by the Society by being elected president in 1923. He was respected as a scientist and was a member of the American Association for the Advancement of Science. He was a member of the American Medical Association for years, and president of the Section on Ophthalmology in 1917-18. He was also a member of the Harvey Society, the New York Ophthalmological Society and many others.

One marked characteristic was his fairness and charitableness to the works of other men; and in reviewing theses for admission to the American Ophthalmological Society and in abstracting papers for the Ophthalmic Year Book, his basis for judgment was, has the man really done good work? Is he honest? Is the subject well presented? If these questions were answered in the affirmative, he would frequently pass a paper with views directly opposed to his own.

He loved, understood and encouraged younger men, and the younger men naturally loved him and looked upon him as a true friend and master; as to them he was ever willing and ready to give his precious time, for the consideration of any perplexing problem. He loved the practice of medicine and his patients, and was ever willing to give his time, strength and skill, and he was rewarded in his later years by an exclusive consulting practice, many of the cases being difficult muscle conditions referred to him by colleagues from all over the world.

As he was not very strong in his later years, he was forced to give up

a great deal of his clinic practice and use his active brain for writing. He was the author of Student's Medical Dictionary, Motor Anomalies of the Eye, and Rules for Signaling on Land and Sea. He was probably best known among ophthalmologists for his translations of Fuchs' Text Book of Ophthalmology, to which he has added so much valuable data that Fuchs stated that each edition was better and better, and the last few editions were really Doctor Duane's. He was the author of numerous monographs and we are only able to mention a few of the most important ones here. "Paralysis of the Superior Rectus and Its Bearing on the Theory of Muscular Insufficiency and the Treatment of Heterophoria" published in 1894, showed his thoro understanding of motor anomalies. In 1899 he published his scholarly Nomenclature of the Ocular Movements. His keen understanding of the relation of ametropia to motor anomalies was shown by his work on Anisometropia in 1901. "The Evolution of Squint" read before the Congress of Ophthalmology at Lucerne showed the result of deep thinking by a keen mind.

His knowledge of and interest in refraction was well shown by two papers, some theoretical and practical points in refractive work and the importance of testing the accommodation as a routine measure in refraction work. He made many valuable contributions to the study of accommodation and convergence, too numerous to even mention here. He was also part editor of Foster's Encyclopedic Dictionary of Medicine, and wrote chapters in de Schweinitz and Randall's Diseases of the Eye, Ear, Nose and Throat and the Eye and Nervous System (Posey and Spiller). He also contributed to Weeks' Diseases of the Eye. He did not confine his writing to medicine alone and he was part editor of the Catalogue of Sigma Phi from 1891 to 1915. He also contributed medical terms to Webster's International Dictionary published in 1890. He was very ingenious and many ophthalmologists knew him for his modifications of the Bjerrum Tangent Screen.

His true love for his work and attitude to his patients was well shown by the following incident. One Sunday he said that he was too busy to go to church and when his family returned he met them at the door with a boyish enthusiastic expression and said, "Did you see him?" They said, "Who?" He answered, "The man whose eyes were straight." They admitted that they had seen a fairly well dressed young man on the street as they approached the house. Then he explained that the young man was a clinic patient who had been unable to obtain a position due to the fact that his eyes were badly crossed and that he had just made a final examination before sending him out to look for a position. They found out later that he had given him one of his best suits of clothes, which accounted in part for the patient's well groomed appearance.

He was an accomplished linguist, and his knowledge of German permitted him to make a splendid translation of Fuchs' Text Book of Ophthalmology. He also had a fair knowledge of French, and read and wrote Latin with ease. He was so proficient in Latin that he enjoyed writing to some of his old friends in that language, and frequently wrote to his sons in Latin when they were in college. His linguistic ability was most helpful in the preparation of his chapter on ocular movements for the Ophthalmic Year Book. One of his strong points was his love for and familiarity with higher mathematics, which was most helpful in teaching physiologic optics. His early training in mathematics came from his father, who saw to it that he was properly trained both in school and college in this important subject.

He even found time in his busy medical life to which he was devoted, to think of the safety and future of his country, so that his record as a military surgeon is an enviable one. He was Signal Officer with the First Naval Battalion N. M., New York, 1899-1900. He was Lieutenant Junior Grade and Signal Officer in the United States Navy in the Spanish-American War, and in 1915 he was Lieutenant Junior Grade Reserve List, N. M., New York.

During the World War he was Signal Officer on U. S. N. Granite State, from 1917 to 1919. He was a member of the Episcopal Church and believed in living and did live a Christian life every day. He was devoted to his family and thru his influence his sons grew into strong, right thinking men, who had admirable records in the World War. His son, Robert, was in the United States Marine Corps, and was severely wounded, so that he was in a hospital for four months. His son, Alexander, was with the 107th Infantry, and was killed in action when the Hindenburg line was broken. He was always interested but never active in politics, and claimed to be an independent democrat. He was deeply loved by all his friends and never forgot one, no matter how long the separation; and he took the time to correspond regularly with many of them. He was ever mindful of the troubles of others and he did many things which showed his understanding, loyal friendship for Doctor Fuchs, when Austria was passing thru her darkest days.

His life was one of work and sacrifice for medicine, in which he was vitally interested, and it was always hard to persuade him to leave for a vacation. These were always short, never more than a month and were spent on the water, if possible, either on a lake in Canada, or on the Connecticut shore. He was fond of tennis and he always loved rowing and swimming from his early childhood and spent a great deal of his leisure time in later years teaching his children to swim. He took great pleasure in reading and his literary tastes were varied. He was a splendid botanist, loved poetry, astronomy, and history, and was always deeply interested in music. He never claimed to be a musician, but he was able to play the piano and the organ, which he felt rested and relaxed him. He was a member of the Hospital Graduate, University and the Sigma Phi clubs. His loyalty was well shown by his interest in and devotion to Union College. He always maintained a youthful interest in everything and this is believed to be the reason why he accepted the position as trustee of the University, perhaps subconsciously realizing that he could see things from the boys' standpoint. He

followed with keen interest all the athletic activities of his college, was devoted to his fraternity and was actively working at the time of his death on the Committee to raise money for a new Chapter House, in which he showed his strong trait of loyalty to the end.

As Voltaire said, "Nothing is more estimable than a physician who, having studied nature from his youth, knows the properties of the human body, the diseases which assail it, the remedies which will benefit it, exercises his art

with caution, and pays equal attention to the rich and the poor." So Doctor Duane lived his life true to himself and to the best traditions of his profession. His motto might well have been, "Master lead and I will follow with truth and loyalty." In his passing his patients, and all those who knew him have lost a true friend, and wise councillor: the world, a high-minded advanced soul: medicine, a devoted servant, and ophthalmology, a great master whose influence and teaching have left a lasting impression.

ABSTRACT DEPARTMENT

Reprints and journal articles to be abstracted should be sent to Dr. Lawrence T. Post, 520 Metropolitan Building, St. Louis, Mo. Only important papers will be used in this department, others of interest will be noticed in the Ophthalmic Year Book.

di Marzia. Fibroendothelioma of the Optic Nerve. *Saggi di Oftalmologia*, 1924, p. 87.

The author's patient, a man of twenty-five, had noted increased exophthalmos for seven years with very marked diminution of vision since the first. Vision was now reduced to light perception and the nerves showed marked postneurotic atrophy. The tumor was removed without any bony resection. The nerve was involved in the tumor and was cut at the apex of the orbit and at its insertion in the globe. The characteristic structure of fibroendothelioma was seen with hyaline bodies resembling those seen in brain tumors. It evidently originated from the pial sheath of the nerve. The author believes a characteristic symptom of such tumors is the rapid loss of vision which is out of all proportion to the exophthalmos. The picture of postneuritic atrophy indicates that the tumor is near the globe and that, hence, a Krönlein orbital resection would not be necessary at operation. Another characteristic point is the absence of any complaint of diplopia. This is due to the rapid loss of vision which helps to distinguish the tumor from other orbital tumors which usually cause marked exophthalmos for a long period of time before vision is effected.

S. R. G.

Ohm, J. The Influence of Light on Nystagmus in Multiple Sclerosis. *Klin.*

M. f. Augenh. 1925, Nov.-Dec., 75, p. 637. Ill.

After a resumé on the frequency of nystagmus in multiple sclerosis, the curves of nystagmus in this disease are discussed in detail and illustrated. Very important is the relation of nystagmus to illumination; its provocation and exaggeration in the dark and its diminution in the light. Definite conclusions as to its origin cannot be drawn from this picture. From the observations of neurologists it may be assumed that also in this case, the multiple sclerosis had affected not only the visual path, but also the nucleus of Deiters. This vestibular nystagmus has optical tracts and is related to the numerous kinds of nystagmus with these properties, as shown by Ohm in miners' nystagmus, dark nystagmus in animals and small children, some forms of congenital and acquired amblyopic oscillations, and in Deiters' nystagmus.

Thus Ohm assumes that the influence of optic and vestibular excitations occur, not in the nuclei of the ocular muscles, but further up in the nucleus of Deiters, where the supra-nuclear fixation center is situated.

C. Z.

Hippell, v. Anatomic Findings in a Case of Primary Syphilitic Disease of the Retinal Vessels. *Archiv. f. Ophthal.*, 1926, Band 117, p. 221.

There has not been reported any anatomic examination of primary syphi-

tic disease of the retinal vessels. A cutler, 53 years old, encountered a sudden disturbance of sight first in the left eye, then in the right. There was no history of syphilis. Vision was found to be motion of the hand with the right eye, with the left 0.3 with correction; concentric contractions of the fields were present. Ophthalmoscopically, both fundi showed some of the retinal arteries changed to thin white lines; some of the retinal veins had constrictions and breaking up of the blood-stream in many places. The right eye showed a flat excavation of the papilla. Wassermann was ++, Sachs-George was +++. The right eye developed a cyclitis, tension rose to 70 mm. with marked pain and no relief from miotics: enucleation was done.

The anatomic findings in the retinal vessels were difficult to describe because of the marked effacement of the different layers of the vessels. Thus in the arteries the muscularis could never be recognized with certainty. The author thinks the muscle cells were destroyed. A thickening of the vessel wall which involved the intima and adventitia came first. The proliferation in the intima was composed of fibers and nuclei of connective tissue cells. An exceptional increase of nuclei was present in the region around the vessel. Lymphocytic infiltration was present in small degree, chiefly in the adventitia. The retinal veins showed complete closure in places. The central artery in its distal part was much narrowed by an eccentric proliferation of the intima. Within the lamina cribrosa, there was a complete closure of the central retinal artery.

H. G. L.

Löwenstein. A New Conception Concerning the Cause of Senile Cataract. Archiv. f. Ophthalmol., 1926, Band 116, p. 438.

The aqueous humor contains a substance which causes swelling and opacity in the lens fibers or in the substantia propria of the cornea, when brought into contact with them.

To prove that proteolytic ferments in the aqueous humor do not cause the lens changes, the author drew off aqueous humor from the anterior chambers

of 8 rabbits' eyes. One half of this aqueous was boiled, the other half left untouched. Into each half a freshly obtained rabbit's lens was placed after destroying the capsule to an equal degree on each lens. No difference in the rapidity of the formation of opacity in the two lenses occurred.

Magitot and Mestrezat have determined that crystalloids are present in higher concentrations in the aqueous humor than in the blood serum. By the addition of crystalloids, but particularly of electrolytes to the colloids in the lens fibers, there occurs a process of precipitation, whose character and intensity depend upon the amount of the ion concerned and upon the pH content. Colloids are present in small concentration in the aqueous humor.

The lens capsule is in a physical sense a colloidal membrane, which the electrolytes of the aqueous cannot penetrate under normal conditions. The permeability of homogeneous colloidal membranes to the passage of crystalloids is inversely proportional to the thickness of the membrane. Thus by the splitting off of the most superficial layer of the lens capsule or zonular lamella of Berger which Elschnig describes as occurring among glass blowers, the lens capsule is partially thinned and consequently made more permeable.

Most colloids and colloidal membranes gradually give off water, take up less volume, are put on tension and become transformed into crystalloids. The lens capsule, a colloid membrane, thus becomes more permeable to crystalloids in the aqueous. Such might be the case in senile cataract. It is also understandable that a cataract might occur thru massage on the capsule with metallic instruments, thus producing microscopic lesions and breaking the integrity of the lens capsule. The observations of Hess and Cavara have shown that this massage causes extensive traumatic destruction of the anterior lens epithelium. This is a definite indication of the marked damage that the colloidal lens capsule must undergo.

H. G. L.

Uhthoff, W. Disturbances of Arterial and Venous Retinal Circulation.

Klin. M. f. Augenh., 1926, Jan., 76, p. 1. Ill.

1. Closure of the upper branch of the central retinal artery with defect of lower part of visual field in consequence of a circumscribed choroidal focus. It was undecided whether the atrophic focus was originally a solitary tubercle.

2. Transient defect of the lower half of the visual field due to a circumscribed, whitish, opaque area in the upper branch of the retinal artery, commencing at the disc and extending a short distance beyond it, in a man, aged 60, affected with arteriosclerosis and diabetes. It showed that transient obscurations in an eye with complete restoration may be due to a marked anatomic disease. This may be situated behind the lamina cribrosa and not be visible with the ophthalmoscope. In other such cases an angospasm is certainly the cause.

3. Right total and left partial thrombosis of the retinal artery after exanthematic fever, with atrophy of the optic nerves in a man, aged 36.

4. Closure of the right inferior temporal retinal artery with fine white foci in its territory after a second salvarsan injection in a syphilitic patient, aged 33. This is the only case of arterial closure after salvarsan which Uhthoff saw, aside from neuritis and neuroretinitis, which all recovered.

5. Thrombosis of the upper branch of the central retinal artery with pallor of the upper part of the disc, with corresponding defects of the visual field. The visual disturbance occurred suddenly in the night, four weeks ago, after a profuse hemorrhage of the stomach five days previously. In intense anemia, increase of the coagulability of the blood and lesions of the endothelium are the factors which may lead to closure of the retinal artery.

6. Thrombosis of the left central retinal artery, in a man, aged 48, with polycythemia, arteriosclerosis and hypertension. The sudden blindness was preceded by scintillating scotoma one half hour previously. The patient had

occasional scintillating scotomata. After two years right hemiplegia with disturbance of speech. As this is the only case of polycytemia with thrombosis, its etiologic import may be doubtful.

7. Secondary glaucoma after thrombosis of the central retinal artery in a man, aged 59, with blindness, atrophy of the optic nerve and very narrow retinal artery. No retinal hemorrhages. After seven weeks, glaucoma with hemorrhage into the anterior chamber. Uhthoff saw only 2 out of 86 cases of secondary glaucoma after closure of the central retinal artery. This patient apparently had a predisposition to glaucoma, since also the other eye developed chronic glaucoma with cataract, which was arrested by extraction of the cataract.

In another patient, aged 77, with thrombosis of the central retinal artery, a prepapillary hemorrhage occurred and then glaucoma.

8. Partial thrombosis of a branch of the central retinal artery in endarteritis syphilitica (congenital lues), in a man, aged 18. The visual disturbance (sector of the visual field) set in seven days ago and gradually increased within two weeks to remain stationary. The arterial branch was obliterated and the corresponding part of the disc pale.

9. Endarteritis syphilitica of a branch of the central retinal artery in a man, aged 35, who acquired syphilis 12 years ago. It was preceded by scintillating scotoma years ago, which was continuous for 4 weeks. The upper temporal branch was narrowed. After 15 years there was only a small remnant of the defective quadrant, but the neurologic diagnosis was incipient tabes and arteriosclerotic changes of the nervous system. The fluctuations of the functional disturbances are characteristic of syphilitic endarteritis.

10. Termination of thrombosis of the central retinal vein in tenonitis, iridocyclitis and phthisis bulbi in a man, aged 43, which occurred half a year ago.

11. Visual disturbances in both eyes from venous congestion in the retina without visible changes in a woman,

aged 47. Aside from venous congestion there were no ophthalmoscopic changes. C. Z.

Felchlin, M. Determination of Specific Weights of Ocular Media. Archiv. f. Ophthalmol., 1926, Band 117, p. 325.

Up to the present, there has been no determination of the specific gravity of any parts of the human eye with the exception of the lens; the latter determination was carried out by Priestley Smith and Vogt. Felchlin's procedure was to put an amount of distilled water into a finely graduated cylinder, to measure accurately the amount of fluid and to weigh accurately the cylinder and water together. Then into the fluid in the cylinder were brought successively the different parts of eyeballs, freshly prepared. There were thus caused an increase in volume of the fluid and an increase in weight of the cylinder and fluid together. The specific gravity was obtained by dividing the increase in weight by the increase in volume. The more material that could go into the fluid at one time the less error in the result. Correction also was necessary to allow for the room temperature.

The material used included 1000 eyes of cattle and 700 pigs' eyes. Results in mean were as follows:

| Media | Cattle's eye | Pigs' eye |
|----------|--------------|-----------|
| Cornea | 1.054 | 1.051 |
| Iris | 1.054 | 1.060 |
| Lens | 1.117 | 1.110 |
| Vitreous | 1.014 | 1.006 |
| Retina | 1.037 | 1.042 |
| Choroid | 1.032 | 1.034 |
| Sclera | 1.098 | 1.091 |

Prof. Vogt concluded years ago that the difference in specific gravity between the vitreous and retina was probably the cause of a tear in the degenerated retina of myopes and seniles occurring first above in the erect posture; the consequence of this tear was a detachment of the retina occurring first in the upper part of the fundus.

H. G. L.

Wegner, W. Ophthalmoscopic Changes in Migrain. Klin. M. f. Augenh., 1926, Feb., 76, p. 194.

Wegner reports two cases of migrain associated with transient blindness

during the attacks and with hemorrhages into the vitreous. Vision did not return until after five years in one case. There was thrombosis of the central retinal artery with hemorrhages into the optic nerve. The nerve was discolored to bluish gray and black and projected like a staff into the vitreous. The circum papillary tissue was not edematous as in choked disc. This occurred in both eyes. In the second case of a man, aged 30, only one eye became blind.

In both, the arteries showed, during the attacks, spastic contractions. The vascular walls became damaged and if coagulation formed in consequence of the endarteritis changes, the next contraction led to interruption of the blood current and, as the arterial pressure was not diminished, to extravasations of blood into the adjacent tissue, and finally to atrophy of the optic nerve.

The variety of optical disturbances in migrain, hemianopsia and total defects of the visual field, scintillating and spectral sensation, finally intraocular changes, prove that the localization of the morbid process is not limited to a certain area, but that the whole optic path at any point may be involved. At the peripheral seat of the disease the same processes may occur as in the much more frequent scintillating scotoma, altho the views of different authors differ with regard to this phenomena.

C. Z.

Wildi, G. Degeneration of the Fundus with Angioid Streaks (Knapp) Klin. M. f. Augenh., 1926, Feb., 76, p. 177, Ill.

Wildi reported four cases with illustrations. Binocular examination with Gullstrand's ophthalmoscope proves that the streaks must lie in the most exterior strata of the retina or in the pigment epithelium or glass membrane. All authors agree that they are behind the retinal vessels. Their origin from hemorrhages is very improbable and, contrary to the views of numerous observers, they cannot be explained by vessels or their pigmentation. A certain explanation of their pathology cannot be given. The "drusen" found in all cases render it probable that changes of the glass membrane have

occurred. The always present granulation of the fundus suggests that the pigment epithelium and finally the glious elements of the retina participate. Several observations suggest heredity. The whole clinical course indicates a degenerative process, probably due to congenital inferiority of the glious elements, the pigment epithelium and the glass membrane.

C. Z.

Abe, T. Sympathetic Ophthalmia Produced with the Herpes Virus. Archiv. f. Ophthalmol., 1926, Band 117, p. 375.

The author succeeded in the intra-vitreous inoculation of rabbits with herpes virus in producing the sympathetic ophthalmia of v. Szily in about 30% of the animals tried; the shortest period of inoculation was ten days. The anatomic changes characterizing this herpetic ophthalmia differed qualitatively in all essential points from the human sympathetic disease, so that the exciting factor of the latter is not the virus of herpes. Both conditions were similar in that the process in the primarily affected eye produced the same changes after a certain interval in the second formerly entirely well eye. The probability is strong that the virus inoculated into the vitreous of the first eye is carried over into the second eye along the trunk of the optic nerve and around the chiasm. There is wanting any proof for the transference of the virus thru the blood. H. G. L.

Isemin, L. Progressive General Paralysis. Gaz. des Hôp., 1926, v. 99, pp. 1045-1050.

The ocular symptoms are very important. They are as follows:

(A) Pupil. (1) Inequality is the most frequent and earliest. Where it is not distinct, it can be evoked by the use in each eye of an equal number of drops of cocaine (de Lapersonne). It is not pathognomonic for general paresis, but always means an affection of the nervous system.

(2) Abolition of the reaction to light—the Argyll Robertson pupil. It is positive in 90% of cases, and may be unilateral. The sign of Piltz may be

present—that is a contraction and then a dilatation of the pupil when the eye is quickly closed and opened. There may be reversed Argyll Robertson, or a paradoxical pupil reflex.

(3) Abolition of the consensual reflex. Myosis is very frequent, but less marked than in tabes. When mydriasis is present, it is the first sign of iridoplegia.

(4) Deformities. Irregularity of the pupil margin, which, however, may be congenital.

(B) Fundus. The disc may be hyperemic or anemic. Atrophy with blindness is as rare in general paresis as it is frequent in tabes.

(C) Muscles. Paralysis of the external muscles is rarer than in tabes. It is transitory and affects principally the motor oculi. In addition to true ptosis, there is a hypotony of the upper lid which is progressive and gives the patient a special expression of atony.

(D) Nystagmus.

C. L.

Duke-Elder, W. Stewart. Action of Ultraviolet Light on the Eye. Brit. Med. Jour., 1926, V. 1, pp. 891-895.

Duke-Elder gives a preliminary report of the effect of ultraviolet light in the treatment of diseases of the eye, based on the observation of seventy cases in the Ultra-Violet clinic of the Royal London Ophthalmic Hospital. The light may be used in the form of baths to the skin of the body generally, general phototherapy, or it may be applied to the eye itself. By general phototherapy, the nonspecific defense mechanisms of the body are stimulated and the bactericidal power of the blood is increased. Chronic inflammatory diseases are most amenable to such treatment. General phototherapy is apt to do harm in the acute stage of inflammatory eye diseases and has its best effect after the acute stage has subsided but before chronicity has definitely set in or too much tissue destruction has taken place.

In the cases treated by Duke-Elder, the ordinary local treatment was continued during the trial of general phototherapy and foci of infection were removed as usual. Excellent results

were obtained in 8 cases of tuberculous and in 60% of 29 cases of infective iridocyclitis, in one case of sympathetic ophthalmia, in two of three cases of choroiditis, and in one case of tuberculous dacryocystitis. Cases of chronic and recurring phlyctenular keratoconjunctivitis cleared up rapidly under general phototherapy. It was not determined, however, whether relapses could be prevented.

Direct application of ultraviolet light to the eye was used by Duke-Elder only in the treatment of diseases of the lids, conjunctiva, cornea, and iris, as he considered the risk of injury to the lens too great with the use of rays of a wave length suitable to affect the retina and choroid. The tissues are affected only by the rays which they absorb; and, dependent on the wave lengths of these rays, the effect may be thermal or abiotic, which latter consists in desquamation of the epithelium and destruction or partial destruction of the underlying cells. In general, in radiating the eye, wave lengths should be used which produce a temporary analgesic and a mild abiotic effect without causing either photophthalmia or burns. The dose should be somewhat less than the minimal erythema dose for the skin of the particular individual. Local is usually supplemented by general phototherapy.

Duke-Elder found that chronic blepharitis, chronic catarrhal conjunctivitis, trachoma, and vernal catarrh responded in a very satisfactory manner to local phototherapy. Corneal ulcers were favorably influenced also. Apparently, the therapeutic action was largely one of irritation and increased vascularity, as bacteria in the cornea are probably not killed by therapeutic doses of ultraviolet light. Phlyctenular keratitis was much benefited by local phototherapy, the photophobia and blepharospasm being at least temporarily relieved. The corneal lesions of some responded well. One case of episcleritis was cured by radiation. In iritis and iridocyclitis, recovery seemed to be hastened by the addition of local to general phototherapy. The course

of cases of interstitial keratitis was little influenced by radiation tho the photophobia was relieved. No effect was noted from the radiation of corneal opacities.

H. P. W.

Percival, A. S. Periscopic Lenses.
Brit. Jour. of Ophth., 1926, July, v. 10.

This is a very excellent contribution which should command the attention of all who have a taste for such problems. The author shows by tables and mathematic equations how the best possible meniscus may be obtained with the present available tools. Periscopic lenses enable the patient to see distinctly when ranging his eyes from side to side instead of being obliged to move his head. Punctal and Katral lenses belong to the class of secret remedies in that the mathematical method involved has not been published. While granting their superiority for photographic purposes, yet there is no evidence to show that they are useful for visual purposes. While the macula is far more sensitive than a photographic plate yet at a short distance all this extraordinary sensitiveness is lost. 5° from fixation, visual acuteness has diminished to 0.25. It is, therefore, a matter of indifference to the eye whether the peripheral parts of the field are accurately focused. In the method adopted by the author, the range of rotation is taken to be 30° in any direction from the primary position. Considerable thought must be given to the preparation of a periscopic spherocylinder. Concave spherical lenses are much more amenable to periscopic treatment.

D. F. H.

Brown, I. C. Conservation of Vision. King Co. Med. Soc., 1926, June 21, p. 4.

It is important to determine to what extent defects in vision can be discovered by examinations which it is practical to conduct in the schools. Do the examinations actually detect defective vision? In the Seattle schools, the examiners, (nurses), have been trained to do this work by competent oculists from time to time, over a period of years. All that is attempted is

to detect defective vision. The school responsibility has ended when we take the child to the oculist's office, but not until this is done.

This report covers observation of children in the grades and has to do with a grade school population of 39,062. From among this number 3,091 children were found with defective vision, (8%), and of these 1,569 or 50% were corrected. This is a good showing considering we have to do with a very aggressive group who do not believe in glasses for their children altho they accept correction for themselves.

For children who are unable to do good work in the regular classes we have special ones, called Sight-Saving Classes, where the children study books of large type and from movable seats so that they may accommodate themselves to the best advantage of the lighting effects. In these classes they learn their lessons and then go into the regular classes of their grade and recite so that they may keep up with their classmates and receive promotion with them.

Where the children are unable because of defective vision to find their way about, they are met at the transfer points and conducted to the school room under school supervision, and at the close of school they are returned the same way and are met at the end of their journey homeward by their parents. Without this assistance given by the sight saving teachers these children would, in all probability, fail to receive an education.

Brown would attribute eyestrain among school children to the following causes: "1, poor lighting in the school room; 2, the arrangement of the seats; 3, the glare from the highly polished surfaces; 4, story or study reading at home, by poor lights or none at all; 5, distance at which work is held; 6, poorly lighted blackboards." E. J.

Herbert, H. Iris Inclusion Complication. Brit. Jour. Ophth., 1926, July, v. 10.

The author reports a case which is of interest due to its resemblance to sym-

pathetic ophthalmitis. Iritis set in in the operated eye ten days after operation, the fellow eye becoming involved soon afterward. The patient had been subject to repeated attacks of rheumatic fever for twenty years. Finally at each attack the eyes became involved as the joint affections subsided. The operation seemed to have troubled the eyes very little. The sudden onset of iritis when eserin instillations were resumed nine days after the operation, suggests that the sudden flooding of the blood vessels of the iris, after a period of marked compression, may have set free or rejuvenated organisms left in the iris from previous rheumatic attacks.

The value of the case lies in the fact that while it establishes clearly an endogenous postoperative complication likely to be mistaken for true traumatic sympathetic disease, it also supplies distinctive features that may be of use in the recognition of other cases of the same nature, perhaps not so fully differentiated. D. F. H.

Beaucamp, C. Treatment of Ocular Tuberculosis with the Partial Antigen of Deycke. Zeitschr. f. Augenh., 1926, Band 59, p. 290.

The partial antigen is prepared by Deycke by treating the tubercle bacilli with lactic acid; the bacilli are thus opened up. The residue consisting of a group of albumins and a mixture of fats is diluted into six different strengths, ranging from 1:100,000 millions (solution 9) to 1:100,000 (solution 3). So many drops are given once a day in a little tea or water by mouth on an empty stomach. One begins with 2 drops of the No. 9; 1:100,000 millions dilution, then on succeeding days 3, 5, 7, 10, 14 drops of the same solution; then during the next six days, the same number of drops a day of the No. 8; 1:10,000 millions and so on.

Beaucamp reports the results in fifty cases of ocular tuberculosis treated by this method observed over a period of 9 months.

| | Diagnoses | Improved | Healed | Recovered | Unhealed |
|-----------------|-----------|----------|--------|-----------|----------|
| Iritis | 21 | 12 | 4 | 3 | 2 |
| Choroiditis ... | 3 | 1 | 1 | 1 | |
| Solitary Tuber- | | | | | |
| cle of the | | | | | |
| Retina | 2 | | 2 | | |
| Orbital Tuber- | | | | | |
| culosis 1 | | 1 | | | |
| Phlyctenular | | | | | |
| Keratocon- | | | | | |
| junctivitis .13 | | 8 | 3 | 1 | 1 |
| Tuberculosis | | | | | |
| of Cornea ..10 | | 5 | 1 | 1 | 3 |

H. G. L.

Woods, Allan C. Sympathetic Ophthalmia, the Use of Uveal Pigment in Diagnosis and Treatment. Trans. of the Ophthal. Soc. of the United Kingdom, 1925, v. 45, p. 208.

In a brief review, the author summarizes his previous work of the allergic theory for sympathetic ophthalmia as propounded by Elschnig, which he had repeated by a clinical and experimental study with the following conclusions:

1. Elschnig's complement fixation studies were in the main confirmed.

2. What was thought might represent sympathetic ophthalmia in the dog was produced thru intraocular sensitization with canine pigment, and intoxication by intraperitoneal injection produced the uveal disturbance in the uninjected eye.

3. Individuals all of whom had suffered penetrating injuries involving the uveal tract were placed in two general groups.

a. Those where normal healing had taken place, had in their blood serum substances capable of combining with the pigment antigen and fixing complement.

b. Those where a protracted cyclitis or sympathetic ophthalmia had developed, did not have these substances in their blood serum.

4. Intradermal tests with uveal pigment were positive in several patients with sympathetic ophthalmia and negative in several normal, control individuals.

The paper reported experiences with diagnostic tests and therapeutic proce-

dure based on the interpretation of the clinical and experimental observations above, namely, that normal healing of an uveal wound was usually accompanied by the appearance in the blood serum of antibodies specific for pigment; but when protracted inflammation followed an uveal wound, these antibodies did not occur and when sympathetic ophthalmia did occur, a cellular hypersensitivity for uveal pigment developed.

Under diagnostic tests the complement fixation reaction and intradermal sensitivity test were considered. The complement fixation reaction was made by testing the sera of 71 patients all of whom had suffered traumatism of the uveal tract; 34 of these sera were positive and 37 were negative. In the positive group 32 showed uneventful healing of the injured eye. In the negative group 12 at the time of the serum reaction had definite sympathetic ophthalmia, 3 sympathetic irritation; 18 advanced cyclitis; necessitating enucleation of the injured eye in 16 cases; 4 ultimately showed healing. Antibodies were never detected before the eleventh day after the injury, usually not for 16 days and in several not before the fortieth day.

Because of the technical difficulties of the test and the development of a positive reaction, it was concluded that the complement fixation reaction with uveal pigment is of little practical value. With the intradermal sensitivity test the object of which was to demonstrate the presence or absence of a hypersensitivity to uveal pigment, 20 normal controls exhibited no instance of hypersensitivity. Likewise there were 10 individuals recovered from penetrating injuries involving the uveal tract who were negative to pigment. Then 30 patients were tested with 16 positive reactions and 14 negative—of the 16 positive reactions, 12 had definite sympathetic ophthalmia; 2 sympathetic irritation and 2 violent cyclitis. Of the 14 negative reactions, 11 recovered uneventfully without involvement of the second eye, while in 3, enucleation of the injured eye was necessary. Cases of a similar nature and

with similar results in regard to the test were cited and it was concluded that the test should be of value in a doubtful case.

In the treatment of sympathetic ophthalmia, pigment carefully obtained from the uveal tract of bovine eyes was used. The pigment was used to specifically desensitize patients to a protein to which they appeared definitely hypersensitive and by its continued injection it was hoped to stimulate the production of pigment antibodies and that such antibodies might have a beneficial effect.

A summary of ten cases so treated showed at least temporary clinical improvement in all. Three patients relapsed, one to hopeless blindness with a phthisical eye; one was complicated by an ill advised operation and the third, treated again with pigment and the disease controlled. Two patients have disappeared from observation. In one patient, pigment therapy was unwillingly abandoned and hopeless blindness quickly ensued. The remaining four patients have shown no return of the disease.

The paper is a technical treatise, requiring study for its full appreciation. The conclusions and data only briefly outlined here, are the logical deductions of a vast amount of careful work well presented.

D. H. O'R.

Leslie, Paton. The Trigeminal and Its Ocular Lesions. Brit. Jour. of Ophth., 1926, June, v. 10.

This contribution is a comprehensive statement of some thirty-seven pages containing a bibliography of eighty-six references, three diagrammatic illustrations and two photomicrographs. It should be read in the original.

The primary nuclei and secondary paths and peripheral distribution of the nerves are discussed anatomically, physiologically and pathologically. Reference to the theories, research work and known facts are gone into in great detail. The second portion of the paper deals with the clinical phases of

the subject and the third with neuropathic keratitis. Under pathogenesis the author discusses in great detail the theories of trophic influences, vasomotor theories, traumatic hypotheses, evaporation hypothesis and bacterial infection. The more the essayist has familiarized himself with the subject both by experience and literature the less satisfied he is with all hypotheses. The large amount of thoughtful work given this paper warrants careful consideration by those interested in ophthalmic subjects.

D. F. H.

Raeder, J. G., and Harbitz, Francis. Atrophy of Eyes (Presenile Cataract with "Glaucoma") Caused by Disease of Carotids. Norsk Mag. f. Laegevidensk. v. 87, pp. 529-551.

The authors describe in great detail the case of a woman, 37 years old, who suffered from a gradual loss of vision; the ophthalmoscope showed marked retinal anemia with changes in the retinal blood vessels. From the very beginning of the disease a progressive, apparently primary, atrophy of the iris with a large irregular pupil had been noticed. There was also an atrophy of the face. Cerebral manifestations appeared and the patient died under the symptoms of a central hemiplegia. The postmortem made evident that all the symptoms originated from an inflammatory obliteration of the big arteries arising from the arch of the aorta, nearly cutting off the blood supply to the head. Microscopic examination of the right eye gave the typical features of simple glaucoma, accompanied by marked atrophy of the iris and ciliary body; no excavation of the disc could be found, no hypertension having been present during lifetime.

The author points to the close connection between the primary atrophy of the iris and glaucoma, and is of the opinion that the pathologic-anatomic features of glaucoma may result from reduction of nourishment of the eye; he thinks also that simple glaucoma with a deep anterior chamber in aged persons may develop in the same way.

D. L. T.

Cameron, E. P. Hereditary Dislocation of the Lens. Brit. Jour. of Ophth., 1926, July, v. 10.

This is a record of fourteen persons affected, all females except one. In each case both lenses were dislocated. The history concerns a great grandmother, grandmother, six in the next generation and sixteen children.

D. F. H.

Meerhoff, W. Treatment of Trachoma with Copperammoniumsulphate Intravenously. Zeits. f. Augenh., 1926, Band 59, p. 161.

The author has treated fifteen cases of active trachoma with intravenous injections of 4 per cent copperammoniumsulphate. One-half to two cms. of the solution are given at a dose, the injections occurring daily or every other day, for from 15 to 25 doses. The symptoms show a marked improvement after the first or second injection. After the third to the fifth injection the conjunctival swelling and the granulomata show a definite diminution. Local treatment was negligible.

H. G. L.

Berner, P. O. Peripheral Relations of the Musculus Dilatator Pupillae. Brit. Jour. of Ophth., 1926, August, v. 10.

In this contribution the author presents his observations gained from a study of a large number of eyes. He was particularly interested in finding out whether the musculus dilatator pupillae had a "punctum fixum." The peripheral part of the dilatator muscle was constantly thickened with long fillets penetrating into the ciliary body taking an oblique course. While the thickening may be lacking in a single section it soon reappears. In surface sections, fillets may be seen in direct connection with the ciliary muscle. This last observation has caused the investigator to examine the structure of the ciliary muscle. The last word

concerning this muscle has not been pronounced. Most authors describe three directions of the muscular bundles "meridional," "circular" and "radial." The latter the author believes should be designated as "oblique." While Dr. Mawas denies the existence of circular fibers, Berner asserts from his investigations that they really do exist. The technic employed and a discussion of the views held by other investigators together with ten microphotographs are embodied in the contribution.

D. F. H.

Clapp, C. A. New Formed Vessels of Specific Origin in Vitreous. Brit. Jour. of Ophth., 1926, August, v. 10.

This is the report of a case in a male aged 33 years, in which within a period of three months vision failed to 15/200. The fundi showed cloudy vitreous, obliterated, slightly elevated nerve-heads surrounding which were numerous hemorrhages and exudates. Below was a very large exudate extending out into the vitreous. Some six months later the right fundus presented a connective tissue formation entirely obliterating the nerve. The nasal retina was detached showing hemorrhages as well as in the attached portion. The left fundus presented a leash of vessels, countless in number, coming out into the vitreous. They came forward from the large arteries and veins, diminishing in size at a focus of eight diopters. The free ends floated about when the eye moved. The right eye was lost by occluded pupil, the left retained a vision of 20/20. Apparently, some doubt the presence of these vessels, yet, while the condition is relatively rare there is no doubt of its occurrence as several American observers have reported similar cases. The patient had a positive Wassermann. Two fundus illustrations and a chart of the fields accompany the contribution.

D. F. H.

Current Literature

These are the titles of papers bearing on ophthalmology. They are given in English, some modified to indicate more clearly their subjects. They are grouped under appropriate heads, and in each group arranged alphabetically, usually by the author's name in *heavy-faced type*. The abbreviations mean: (Ill.) illustrated; (Pl.) plates; (Col. Pl.) colored plates. Abst. shows it is an abstract of the original article. (Bibl.) means bibliography and (Dis.) discussion published with a paper.

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